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The Development of an Out-of-School Program for Creative, Empowered Exploration in Hudson, New York

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Abstract

This Integrative Master's Project ("IMP") describes the design and implementation of an out-of-school program that I have developed and facilitated in Hudson, New York. The program, "Kids Create," provides elementary school-aged children with opportunities for creative, empowered exploration through project-based "design and build" workshops. The IMP begins with the rationale for Kids Create, setting forth my educational, political and social motivations for developing the program, and providing a brief overview of relevant professional literature in three areas: the impacts on children of participating in out-of-school time programs; the benefits of arts experiences for children; and the benefits of providing science, technology, engineering and mathematics ("STEM") learning in out-of-school time programs. The IMP then examines the context for Kids Create, describing the Hudson community and the developmental characteristics of children in the ages served by the program. The IMP then explains and illustrates the Kids Create program. It provides an in-depth description, lesson plans, and photographs for one workshop, selected materials and photographs for other workshops, and descriptions of the strategy, mission and common elements of all Kids Create workshops. The IMP concludes with my reflections on the accomplishments of Kids Create, potential next steps for continued development, and my own experience of developing and facilitating the program.

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PART I – RATIONALE

A. Motivations

1. Educational Motivations

The "Kids Create" program was born of my desire to bring the qualities of a learning environment that I, myself, experienced in an arts program in my childhood and have since observed in certain progressive private schools in New York City, to children who live and attend public school in the small, economically-depressed city of Hudson, New York. In this paper, I will refer to the kind of learning environment I seek to provide as an environment of "creative, empowered exploration" or "CEE." My desire to create such an environment for children arises from my own personal history and my education, training, observations and beliefs as an educator.

Early Experience as a Student in a CEE Environment

As a child, I experienced such a CEE environment fleetingly, and happily, at an arts program I attended for one year, and that environment contrasted sharply with other, more judgmental and pressured learning environments I experienced. I attended that arts program when I was in second grade, and my family was living in Australia. The program was housed in an old two story home, with many rooms, each of which was set up as a studio for a particular art medium, such as ceramics, painting, papier mache. Each room was staffed by a teacher who worked with the children who came to participate in that activity that day. Children could pick whichever activity they wanted when they arrived and could move between rooms freely.

I remember quite clearly the feelings I had in that program. First, I felt a sense of freedom. It seemed grown up and much more free than school to be allowed to pick my

own activities and make my own decisions about how and when to finish something, and when to move on to something else. Second, I felt a sense of ownership. I perceived that the program was mine to use and be in; I had a sense of ownership about the space, the materials, the community there. Third, I felt a sense of exploration. I tried out a lot of things there, and I wasn't afraid to try things, even if I didn't know whether I would be able to make something I would like. It was okay there to start things and decide to start over, or decide that I really preferred some other medium and wanted to go back to it rather than finishing some other thing I had tried. It was a safe place to explore and try things out. Finally, I felt a sense of fun. The atmosphere was creative, playful and exciting, and I didn't feel any pressure about what results we achieved or what we learned. Rather, I experienced the program as a relaxing contrast to the school day, and I experienced the teachers, who worked there part time and had other jobs or art careers, as relaxed and engaged with us kids and the making of art.

That arts program holds real importance for me as a place where I was able to create and explore with exciting materials and projects, and with the support of caring adults who taught me things in a relaxed non-judgmental way. I rarely experienced this combination of factors elsewhere, and I have come to see it as the environment in which learning and growth feel to me most engaging and expansive and full of possibility. My experiences in that arts program have stayed with me my whole life, and I have long dreamed of creating some comparable offering for children. Thus, in one sense this project represents the not-uncommon pursuit of an adult to create a condition for growth that she wanted or benefitted from as a child.

Experiences as an Educator in Environments of Creative, Empowered, Exploration

My interest in creating a CEE environment for children also stems from my observations and understanding as an educator that such a setting can strongly support a child's creativity, curiosity, interest in learning, and initiative, as well as the child's ability to make discoveries through experience and problem solving. These observations, which took place in a range of academic settings and subject areas, were made while I was an assistant first and second grade teacher in a private school just out of college, during my later experience as a student teacher in the wood shop of a progressive New York City private school, and in a number of my graduate education classes at Bank Street. Without trying to exhaustively recount those observations, I will briefly touch on a couple of features of each setting.

As a young assistant teacher in a small private elementary school, I was particularly struck by the environment of CEE that the school created in its mathematics curriculum. In that school, mathematics was taught in half groups, so that the teacher-student ratio for each group was low (approximately 1 to10), and children attended two different types of math class each week, one that included written mathematical notation, and one in which children explored concepts and mathematical operations through the use of Cuisenaire rods. The rods classes were conducted in a carpeted room with no tables or chairs, and the teacher and children sat on the floor in a circle. The two types of math classes were structured so that children worked on new concepts and operations with rods for a significant period of time before they were shown the mathematical notations for what they were doing, and even longer before they themselves employed those concepts and operations in written form. Rods classes were structured as a series of

inquiries that led the children to make particular discoveries, while also leaving room for children to try variations or extensions of the task at hand, so that they could make their own additional discoveries, and try out their own hypotheses. For example, an opening question for first graders might be "how many two–rod trains can you make that are as long as the orange (ten) rod?" Such a questions creates a time and space for children to explore the inquiry at hand (two-number additives that equal ten), while allowing them to make different choices about how to proceed, and to develop different ideas about how to continue based on their interests and understanding. Thus, in response to this question, one child might pick up the first rod she sees and then guess at the second rod to use, trying others until one fits with the first and lines up under the orange (10) rod; another might start with a particular rod and then develop a hypothesis about what goes with it (by remembering past play with the rods, by counting, or by some other means) before picking a companion rod to try out; one child might work in numerical order, starting with a 1 for the first train, then with a 2 for the next one and so on, and might realize by the 5 rod, that the rest of the trains in the series are going to be the same as the first four but in reverse order (e.g., with the 6 rod before the 4 rather than after it). The rods curriculum was much loved by many members of the faculty, and a couple of senior educators who then worked in administrative roles still taught sections of rod class because of their passion for the method.

During my later experiences as a student teacher in another progressive private school, I saw an environment of CEE in every classroom I visited, and particularly in the wood shop, where I worked. That school utilizes a child-centered, experiential, inquiry-based curriculum, and the social studies themes studied by a particular grade provide an

integrated framework for all of that grade's studies for the year. Children at that school go to the wood shop for classes beginning in first grade. They attend woodshop in half groups, so that the teacher-student ratio is always less than 1 to 10, and children have access not only to wood, nails and glue, but to well-made, child-sized workbenches, and a good supply of hand tools, including hammers, saws and drills. The wood shop curriculum is largely unstructured, except that at the outset of each year, the teacher designs an activity that all children in each grade will complete in order to gain experience with a particular tool. For example, at the beginning of second grade, the teacher asks the children to each take a square of plywood, draw the outline of an animal on it and then cut it out with a jig saw; this gives the children practice in using the jig saw, as well as understanding of what the tool is good for. After this beginning activity, children are largely free to make what they want for the rest of the year. Children sometimes find inspiration in the woodworking books in the room; often, however, the inspiration comes from the themes children are working on in their other classes. For example, I saw a number of children who were studying cities in their grade make cars or buildings in woodshop to add to the cities they were constructing out of blocks in their classroom. A group of older children studying Greek history built a small-scale chariot to use in their classroom's culminating play based on the Iliad, and children studying the Lenape made tools in woodshop to add to the model shelter they constructed in their classroom. The woodshop teacher, who was a multi-media artist, allowed the children to pick their own projects, pursue ambitious ideas, and learn by trial and error. She set up a work space that children could quickly learn how to use and clean up on their own; she ensured that rules necessary for safety were followed; and she acted as a guide when help

was sought. Apart from that, she stepped back and – amidst the moderate level of chaos that joyful, creative construction by ten children produces -- took stock of what each child was working on and how each child was developing in terms of motor control, planning, focus, creative expression, and interpersonal skills. The children loved wood shop. When it was their turn for shop, they typically walked right in, pulled out their pieces, and started working and talking to the teacher excitedly all at once. And when they finished a project, their pride was obvious in their eagerness to show their work to their classmates, their classroom teachers and their parents. It was a happy, busy, loud place. Thumbs were banged. Dreamt-up ideas were transformed into tangible objects. Children focused and struggled; children beamed.

The other CEE environments I have recently experienced were in some of my classes at Bank Street, particularly the Arts Workshop for Teachers, Children's Literature in a Balanced Reading Program, and Mathematics for Teachers in Diverse and Inclusive Educational Settings. A brief description of the Arts Workshop will provide an illustration of these CEE experiences in my graduate school education. The Arts Workshop class time consisted of two main components: student participation in art activities that the course instructors set up and introduced to us just as they would for children; and then discussion of, and reflection on, the activities, informed by related theoretical readings previously assigned. This approach gave us students the opportunity to simultaneously observe and reflect on the course instructors' methods and style, and experience something of what children in such a class would experience. This approach was profoundly helpful to me in understanding how teachers' set up of the activities and space can impact the way a student will experience the environment and the opportunities

in it. The features of this environment that made it one of CEE (for me and the other graduate students, as well as for the Bank Street school children who also created art in that space with those teachers) included the following:

(a) the physical layout of the furniture and supplies was designed to allow for independent set up, working, and clean up;

(b) whenever a new art medium was introduced, the instructors started with an activity designed to encourage exploration of the medium, by providing a limiting structure with complete freedom within that structure – for example, when introducing collage, the first day is spent using only newspaper and brown craft paper, which may be cut, torn, and shaped in any way;

(c) the instructors did not create expectations about what a finished product "should" look like, instead providing visual "sources of inspiration," such as photographs of modern and historical works made in the medium, and pictures showing the source or manufacture of the medium, and starting the activity by asking open-ended questions about the kinds of decisions a student might make as they worked with the medium (e.g., *"What kinds of shapes could you make with this material?" "Will you use the colors in the pots or make a new color?" "Can you picture in your head a special place you have seen?"*);

(d) the instructors never expressed any kind of judgment – whether favorable or unfavorable - about a student's work, instead using their conversations as a time to look together at the work, giving the student an opportunity and language for reflecting on it (e.g., *"You used different kinds of dots in different parts of this painting - did you make the dots all the same way or different ways?" "You*

painted a thick green line all the way around your painting - did you start with that? It holds your whole painting together."); and

(e) the instrutors clearly loved facilitating students' experiences with art and seeing students explore and develop.

Each of these experiences has contributed to my understanding of the conditions that underlie an environment of CEE for children. The critical conditions that I have observed in these environments are the following:

- children are entrusted with concrete materials and tools;
- creative expression and the exploration of important concepts are prioritized;
- children are given ample time and space to use and explore the material, tools, expression and concepts;
- children are given freedom in what they make and the solutions they pursue, but they are also offered adult support ("scaffolding") that permits them to reach results that are just beyond their independent reach;
- the teacher-student ratio is low enough to permit such exploration and scaffolding;
- and the teachers enjoy, and are interested in, the children, the activities, and the subjects and concepts being explored.

As will be apparent from the description of Kids Create below, I have sought to create each of these conditions in my program.

2. Political and Social Motivations

An additional motivation underlying this project is my desire to make some concrete difference (even if small) in the profound inequality of learning opportunities afforded in this country to children of different socio-economic classes. The environments of CEE that I have described all existed in private settings, accessible only to those families with sufficient resources of time, money and/or know-how to secure them for their children. This is not to say that such environments never exist in public schools or public out-of-school programs, but they are certainly rare, and for good reason – in my experience, it is extremely difficult, if not impossible, to create such environments without a low student-teacher ratio, substantial teacher preparation time, spaces that can get messy and loud, and a good stretch of class time that can be devoted to exploration, without fixed standards for results, and without reference to testing expectations. The contrast I have seen, particularly in my four student teaching placements, between the educational environment provided in the private, progressive schools described above, and that provided in many New York public schools is startling. In the latter environment, children are often given very little trust, responsibility and freedom to make choices, and they have little, or no, time and space for creative, empowered exploration. In my experience, this results not only in an environment that that may suppress children's interests, energy and creativity, but one in which children largely miss out on some fundamental aspects of learning. These include problem-solving, learning through trial and error, having the experience of transforming something imagined into something designed and built (thus, honing executive functions like planning, sequencing, conceptualizing), developing the habit of acting on curiosity

by trying to find answers and figure things out, and developing the disposition of coming up with ideas and expressing or enacting them.

This study in contrasts has contributed to my desire to create a program that can give these kinds of learning opportunities to children who attend public school in the small, economically-depressed city of Hudson, New York, where I live part-time. I wanted to offer children in the community a CEE in which they could make playful creations that integrate creative self-expression with mastering and exploring important concepts about the world and how it works. Such a program is, of course, not a solution to the profound resource inequities (financial, educational, and otherwise) that exist between children in this city, state and country, but is something that can make a difference to some children by giving them a chance to benefit from the kind of CEE learning opportunities that are usually accessible only to those more privileged.

B. Professional Literature

A substantial body of professional literature examines the impacts on children of (1) out-of-school time ("OST") programs, (2) hands-on art experiences, and (3) science, technology, engineering and math ("STEM") activities. Each of these three areas is relevant to Kids Create, which offers OST workshops combining artistic expression and exploration of STEM concepts. The major trends in these three areas of literature are summarized below. The findings of this literature demonstrate that an OST program offering hands on, exploratory art and STEM activities may provide children with significant benefits in terms of cognitive and creative development, as well as academic and behavioral outcomes. In addition, I believe that out-of-school programs offer something valuable if they help children actively and enthusiastically engage in activities

that entail creative expression, discovery, exploration of important concepts, and/or problem solving. I believe that such engagement contributes to a child's sense of meaning, competence, control, and gratifying participation in the world; that these are important ends unto themselves; and that these ends likely also lead to other positive results via "transfer through motivation" (Catterall, 2002, pp. 154-55).

1. Impacts of Out-of-School Time Programs

Out-of-school programs provide benefits to children by providing them opportunities to learn and socialize in settings different from school. Such programs can give children the chance to interact in a different peer setting (e.g., with a different group of children, or children of different ages); get involved in activities that may be more interesting or motivating to them; engage in different ways of learning or thinking about a topic; and experience more personal attention from adults (Little, 2009, p. 6; National Institute on Out-of-School Time, 2009, p. 2). OST programs may also provide opportunities to go more deeply into a subject, and may offer a choice of related activities of interest to participants. Little, 2009, p. 10). The differences between OST programs and school settings may make OST programs a particularly favorable environment for children with disabilities to develop skills and relationships, and also a particularly favorable environment for science learning among groups that are historically underrepresented in STEM fields (National Institute on Out-of-School Time, 2009, p. 2). One expert on OST programs has spoken of the important opportunity to "afford[] children and youth opportunities to learn and practice new skills through hands-on, experiential learning in project-based afterschool programs, which complement, but do not replicate, in-school learning" (Little, 2009, p. 5).

While OST programs have existed for more than a century, the prevalence of such programs has grown significantly over the past four decades, and particularly since the late 1990s, with increasing maternal employment. (Bodilly & Beckett, 2005, pp. 11-22; Little, 2009, p. 2). As funding for these programs has grown, and, with it, the role of governments in funding and operating OST programs, programs have come under greater scrutiny and been asked to produce measureable results in terms of skill building, preventing risk behaviors, and improving learning (Bodilly & Beckett, 2005, pp. 11-22; Little, 2009, pp. 2-3).

OST proponents concur in concluding that "quality after school program environments foster inquiry, critical thinking, and engagement in learning, and these features can support a range of positive academic and developmental outcomes" (Little, Wimer & Weiss, 2008, p. 10). These conclusions are supported by a number of studies that have compared the outcomes of participants in OST programs with non-participants (Bodilly & Beckett, 2005, pp. 46-7; Little, 2009, pp. 4-5; Little, et al., 2008, pp. 1-5). The positive outcomes associated in these studies with consistent OST participation include improved academic achievement, positive social relationships, and avoidance of drug use, crime and early sexual activity (Little, et al., 2008, pp. 1-5). It should be acknowledged that while there exists widespread support for a link between participation in OST programs and improved outcomes, it is difficult to pin down exactly how much OST programs *cause* or *contribute to* the desired outcomes because the relevant studies show only associational connections, and often fail to control sufficiently for selection bias. (Bodilly & Beckett, 2005, pp. 42-46; National Institute on Out-of-School Time, 2009).

The benefits that may be created by an OST program depend, of course, on the quality and efficacy of the program. While there exists no clear list of "dos" and "don'ts" for such programs, the literature does converge on a set of desired features for OST programs. The literature from the fields of school-age-care, youth development, and education suggest that the following factors all contribute favorably to OST programs: clear goals and expectations for the program and participants; limited group/class size; strong staff training; partnerships with families, volunteers and community; positive emotional climate; opportunities for children to feel they belong; warm relationships between and among staff and children; and plenty of time for children to engage in age-appropriate, interesting activities that allow them to develop or hone new skills (Bodilly & Beckett, 2005, pp. 62, 65, 68, 72). Studies specifically focused on OST programs point to similar factors, and suggest that positive outcomes for youth are most likely to be achieved when participants have (a) access to, and sustained participation in, the program; (b) the program offers high quality staff and programming; and (c) the program has effective partnerships with families, schools and the community (Little, 2009, pp. 7, 11-12; Little, et al., 2008, pp. 5-8). In this context, high quality staff are staff who model positive relationships, listen actively, provide individual feedback and clear expectations, and promote student mastery of skills (Little, et al., 2008, p. 7). High quality programming refers to intentional programming with a clear vision and goals, strong leadership, and well-trained and supported staff (Little, et al., 2008, p. 8).

Realizing the potential benefits of OST programs also depends on sustained participation in the programs. Unfortunately, inconsistent participation from enrollees is a pervasive problem, and it is therefore important that programs assess what families

want and need from OST offerings to ensure that families are motivated to participate (Boddily & Beckett, 2005, pp. 36-38, 85). Notably, there are some significant differences in the wants and needs of low-income and minority families, and other families, with respect to OST programs. Most importantly, low-income and minority families are far more likely to prefer academically-focused activities for their children's OST programs, and children from those families are themselves more likely than other children to be interested in academically-oriented programs (Boddily & Beckett, 2005, p. 33; Wallace Foundation, 2011, pp. 29-32). By contrast, non-minority, non-poor families are more interested in giving their children time to play, relax and pursue their interests (Wallace Foundation, 2011, pp. 29-30). In addition to understanding the wants and needs of potential participants, programs may also increase motivated participation by helping participants and their parents understand the value of participation in the program; by conducting outreach to families in their communities; and by encouraging friends to enroll in a program together (Lauver, Little & Weiss, 2004, pp. 4-10).

Sustained participation in OST programs can be affected not only by motivation, but also by environmental barriers that hinder participation (even by those who are motivated). The primary environmental barriers to sustained participation in OST programs are lack of awareness of programs, scheduling difficulties, and cost and transportation (Bodilly & Beckett, 2005, pp. 78-79). To address these barriers and promote participation, OST programs may consider locating programs in underserved neighborhoods, providing transportation, and providing programs without charge (Boddily, Mccombs, Orr, Scherer, Constant & Gershwin, 2010, pp. 37-42).

In short, OST programs can provide children with important and valuable opportunities for growth and learning that can lead to improved outcomes in a variety of areas. In order to realize the benefits of those opportunities, programs must provide high quality programming and staff, meet the wants and needs of families, engage children in well-thought out, interesting activities, and address the barriers that prevent motivated children from fully participating.

2. Benefits of Arts Experiences

The professional literature addressing arts education documents many important benefits afforded to children by participation in high-quality, hands-on, exploratory arts activities (Seidel, Tishman, Winner, Hetland & Palmer, 2009, pp. 17-28). High quality in this context refers to programs containing some or all of the following elements: "engagement," "purposeful experiences creating or engaging with works of art," "emotional openness or honesty," experimentation, exploration, and inquiry," "ownership" (Seidel, et al., 2009, p. 30). As explained more fully below, such programs provide children with opportunities to reflect on and organize emotional and cognitive experiences, and to develop non-verbal forms of communication, which they can use to express themselves, invent and understand, and "read" the artistic aspects of human culture.

First, making art provides children a way to "make meaning" – to represent, reflect upon, and internalize their experiences, including their learning experiences (Eisner, 1990, pp. 53-55; Gwathmey & Mott, 2000). In other words, making art is an aspect of the child's construction of knowledge through the child's experience with the environment. When children represent their experiences through art, they do not just

share their experiences; they also organize, investigate, unify, remember, and further develop what they have understood. Thus, "intense artistic activity . . . enables [a child] to become immersed in a subject," (Gallas, 1991, p. 154), and the child's artistic creation "transforms and integrates [the child's] accumulated collection of facts and information into a unified whole or composition with deep personal meaning" (Gwathmey & Mott, 2000, p. 154).

Second, creating art develops children's minds, including their cognitive abilities. When children look at the world and select essential elements of it to include in their representations, they are performing an important cognitive task. This task is closely related to the process of recognizing and selecting important information from what we hear or read (Eisner, 1990, p. 49).

Third, art provides children a way to integrate their thoughts and feelings, and to make sense of their thoughts, feelings and experiences (Gwathmey & Mott, 2000, pp. 2-3). Such integration is central to the child's well-being and self-knowledge.

Fourth, art provides children with a form of communication beyond written and spoken language that can be used to show learning and understanding (Eisner, 1990, pp. 53-4). Because some children find non-verbal modes of communication more accessible or more communicative (e.g., due to language barriers or the child's particular sensibilities and abilities), a school's provision of a comprehensive art program may "offer opportunities for all children to communicate their new knowledge and expanded understanding of the world" (Gallas, 1991, p. 28).

Fifth, making art allows children to develop their capacity to be inventive. When a child sees something unplanned emerge in the process of creating, and the child pursues

that path to create something new, the child is developing her ability to think flexibily and to take advantage of unexpected opportunities (Eisner, 1990, p. 54). These are critical skills in our rapidly-changing world.

Sixth, the arts (including painting, music, and theater) are important parts of our human culture. As one writer has articulated, " [c]hildren, premodern and prehistoric people, and artmakers commonly and naturally use spatial, mechanical, musical, or kinesthetic – that is, nonverbal – modes of thought" (Dissanayake, 1995, p. 45). In order for children to fully experience these artistic parts of human culture and the meaning in them, they need to become literate in these forms of communication. Engaging in art-making is one important means of gaining that literacy (Eisner, 1990, p. 52).

3. Benefits of STEM Activities in OST programs

The importance of STEM learning is much emphasized in current professional literature in this country, usually alongside a commonly-held concern that most American children do not possess the math and science skills needed for the increasing number of STEM-related jobs in the U.S. (National Institute on Out-of-School Time, 2009, p. 5). This literature, in addition to highlighting the critical importance of STEM education generally, points to a particular role for OST programs in providing STEM activities. OST programs are seen as being able to provide more informal and flexible learning environments that "can feed or stimulate the science-specific interests of adults and children, may positively influence academic achievement for students, and may expand participants' sense of future science career options" (National Academies Press, 2009, pp. 2-3). In particular, OST programs can provide both additional time beyond the school day for children to engage in STEM learning, and a broader range of activities and

experiences through which children may approach STEM concepts and principles (Afterschool Alliance, 2001, p. 1; Fancsali & Froschl, 2006). The more informal atmosphere of OST environments, and their ability to offer diverse modes for engaging students in STEM learning, are seen as particularly important for improving STEM knowledge and interest among individuals from groups that have been historically underrepresented in science, such as women and minorities (Fancsali, C. & Froschl, 2006; National Academies Press, 2009, pp.180-1, 303; National Institute on Out-of-School Time, 2009, p. 5). In order to achieve these potentials, the Board on Science Education recommends that OST programs offering STEM activities:

- be designed with specific learning goals in mind (e.g., the strands of science learning)
- be interactive
- provide multiple ways for learners to engage with concepts, practices, and phenomena within a particular setting
- facilitate science learning across multiple settings
- prompt and support participants to interpret their learning experiences in light of relevant prior knowledge, experiences, and interests
- support and encourage learners to extend their learning over time

(National Academies Press, 2009, p. 307). Given the current focus on STEM learning, and the special role of OST programs in STEM education, OST programs around the country are becoming increasingly involved in STEM learning (Afterschool Alliance, 2011, p.1; see also, e.g., Cornell University Cooperative Extension, 2012).

PART II - CONTEXT

A. Community Served

1. Demographics

Hudson is a small city in the Hudson Valley region of New York State. The city occupies approximately two square miles of land and is home to approximately 6,700 people, 22% of whom are under the age of 18. (U.S. Census Bureau, 2012, Hudson). Hudson is a socio-economically diverse city that includes notable populations of weekenders, gay couples, artists, and low-income persons who live in various forms of subsidized housing, including public housing towers and hotels converted to single room occupancy. It is the county seat of Columbia County, and it houses a significant percentage of the County's poor. The city has a poverty rate of 21.8%, double that of the county (9.5%). (U.S. Census Bureau, 2012, Hudson; U.S. Census Bureau, 2012, Columbia County). The city is racially diverse, with significant African-American (25%) and Latino (8.2%) populations, and visible Bangladeshi, West Indian and Haitian communities (U.S. Census Bureau, 2012, Hudson). The city serves as a dining, shopping and entertainment destination in the Hudson Valley region and has been dubbed "upstate's downtown." ("Hudson, NY Upstate's Downtown," 2010). Hudson has a particularly strong arts community and boasts a high number of art galleries, arts organizations, and performance venues for a city of its size.

2. OST Programing in Hudson

A handful of providers offer OST programming in Hudson for elementary school-aged children. By far the largest provider of OST programming is the local school district (serving Hudson and neighboring communities), which runs an after-school

program at each of its four schools (the elementary school (pre-K-2), intermediate school (3-6), junior high (7-8), and high school (9-12)). This program is funded largely by grants from the federal government (21st Century Grant) and state government (Advantage Afterschool grants) (November 2010, unpublished program newsletter). Admission into the program is free and offered on a first come, first served basis. Demand exceeds the program capacity, and the School District had to lower the number of available slots this year due to funding cuts; at the elementary level, available slots dropped by over 20%, from 370 to 290 slots per session (Hudson City School District, 2012). Children who sign up for the school's after-school program are expected to attend the program all five days of the school week (November 2010, unpublished program newsletter). The program provides free busing, a bag dinner, and two activity sessions per day; at the beginning of each of the four annual registration periods, the child/family chooses the child's activities from offerings including homework help (monitored "study hall"; not tutoring); crafts; cooking; drumming; outdoor recreation (November 2010, unpublished program newsletter). At times, an outside organization will collaborate with the school district's afterschool program to provide an activity off-site; for example, a local farm and Waldorf school offers a farm-based program, to which it provides its own transportation. Such collaborations have the potential to increase the capacity of the school's afterschool program if they are offered all five days of the week.

Two Hudson non-profit arts organizations offer OST programming in their own facilities. One of these is Time and Space, Limited ("TSL"), the current home of the Kids Create program. TSL offers theater, cinema and other arts programming in a converted bakery building in Hudson. TSL has a small staff, and the organization's programming,

fundraising and management are all handled by the two founders, who started the organization over 20 years ago. At various points, TSL has had a youth program director on staff who has organized periodic workshops for children. When I began working with TSL in 2010, the organization did not have a youth program director and was not in a financial position to hire one. I took on the role of pro bono youth program director for the organization, and began the Kids Create program. In addition to the Kids Create workshops, TSL now offers music workshops taught by another instructor.

The other local arts OST program provider is a multi-arts organization that offers diverse programming, including music and dance performances, visual art exhibitions, and weekly classes for youth. Its current offerings for children of elementary age include a book group for 3rd to 5th graders and their parents, a hip hop dance class for children aged 6 and up, and an environmental education class for children aged 6 and up. This organization offers some of its programs -- such a family African dance and drumming workshops -- in collaboration with another local organization that focuses on empowering youth of color in the community.

In addition to these more structured OST programs, city agencies provide "drop-in" supervised recreation opportunities at the local youth center and library. The youth center is open to children ages 7-13 from 3 to 6 pm each school day; it admits children free of charge and provides snacks and dinner; and children can be dropped off there from the school bus. While the Youth Center offers some organized activities (e.g., running club, crafts), it primarily functions as a supervised recreation area where children can hang out together, do their homework, and choose from activities like ping pong, pool, computer use and basketball. Approximately 25-20 elementary-aged children visit

the Youth Center each afternoon, and the majority of participants are African-American and from low-income families (former youth department staff member, personal communication, October 5, 2012). The local library provides supervised learning and playtime for children Tuesdays through Fridays from 3-5 pm and on Saturdays from 10-3. This program is free, requires no registration or ongoing participation, and offers activities like crafts, leisure reading and movies. It also offers occasional one- or two-session workshops for youth, such as a radio-programming workshop provided in collaboration with the local radio station.

B. Developmental Characteristics

Kids Create is primarily aimed at children aged 7-11 (although enthusiasm for the program has led to inclusion of 6 and 12 year olds in some workshops). This section will describe the developmental characteristics of children in the 7 to 11 age range based on theory and research, and it will indicate the manner in which the program addresses these characteristics.

Children in this age range fall into the developmental period referred to as "latency" or "middle childhood." This is a critical period for development of the child's ego; the key developmental challenge of this period has been characterized as building a sense of competency and industry, rather than falling into an experience of inadequacy and inferiority (Erikson, 1962, pp. 226-227). Middle childhood is also a time in which children make significant gains in their cognitive abilities, and do so in large part by interacting with the physical environment. (Flavell et al. 2002, pp. 140-144). Kids Create seeks to promote children's cognitive development and sense of competency by engaging them in meaningful hands-on, constructive activities designed to lead to

discovery, knowledge, and a sense of accomplishment. Kids Create provides these activities in the context of social interaction and scaffolded support because such an environment has been recognized to promote children's learning and growth (Berk & Winsler, 1995, pp. 11-50).

1. The Challenge to Develop a Sense of Competency

To help support children going through the period of latency, Kids Create offers opportunities to develop new skills and areas of knowledge, and to make concrete, creative works that reflect and showcase children's newly-gained understanding, knowledge and skills.

Latency is a time in which the child's "sexual and aggressive drives, which produced crises at earlier periods, are temporarily dormant," thereby creating room for a critical stage of cognitive and skill development, and accompanying ego growth (Crain, 2000, p. 254). Because the child at this stage is less consumed with "their past hopes and wishes, which were often played out within the family," the child can devote much of her energies and capacities to "learning the useful skills and tools of the wider culture". (Crain, 2000, p. 255). Erikson, in his Eight Stages of Life, describes the challenge of this latency period as the crisis of "industry versus inferiority," (Erikson, 1962, pp. 226-229). If a child is able to navigate successfully through this stage, her new skills and cognitive abilities will contribute to her sense of industry and competence; to the development of a solid ego. The profound risk at this stage is that the child's experience of cognitive and social development is not a positive one and instead leads to "an excessive feeling of inadequacy and inferiority" (Crain, 2000, p. 255). Thus, middle childhood is a critical time for healthy ego development, connected closely to the child's experience of her

developing cognitive capacities and her ability to become adept with social skills, and other tools of her culture.

2. Middle Childhood and Cognitive Development

To help foster children's cognitive growth, Kids Create offers diverse opportunities for children to problem-solve, and to apply and adjust existing knowledge to take in new understanding (i.e., to assimilate and accommodate). It also engages children in the practice of metacognitive skills such as planning, and assessing problem-solving progress.

During middle childhood, children make profound gains in their ability to think abstractly. Children develop cognitively via a process of assimilation and accommodation, in which the child fits what is experienced or seen into the framework of what the child already knows and understands (assimilation), and also adjusts her knowledge framework to accommodate what has been newly- experienced or seen (accommodation) (Flavell, 2002, pp. 3-8). This "dialectical process" is one of discovery that leads to ever growing knowledge and understanding. (Flavell, 2002, p. 7). Under Piaget's theory of cognitive development, children in middle childhood are reaching the third of four cognitive development stages (now more frequently understood as developmental “trends” rather than rigid, sequential stages) in which they can apply mental operations to concrete objects ("concrete operational” stage) (Flavell, 2002 p. 4, 139-149). At this age, children can now: look beyond appearances to infer from evidence; focus beyond the most central feature of stimuli to other relevant features; consider past and future states and processes of transformation in addition to present states; conceive of the potential for reversing or counter-balancing operations; and

understand that problems may have specific, quantifiable solutions (Flavell, 2002, pp. 140- 144). During this time, children's problem-solving capacity expands significantly because they now have available to them greater information processing capacity; greater knowledge about the workings of the world and human concepts; and greater metacognitive skills, meaning cognitive understanding and strategies *about* cognition (Flavell, 2002, pp. 159-165). The metacognitive skills children are developing and applying at this age include self-regulation, monitoring of one's problem-solving progress, and planning to reach a solution (Flavell, 2002, pp. 166-167, 170-171; Ellis & Siegler, 1997). These metacognitive skills are central to children's capacity for problem-solving and learning, and studies show that these skills can be taught. Flavell, 2002, p. 167) .

3. Social Aspects of Learning

Recognizing the social aspects of learning, Kids Create provides opportunities for children to plan, problem-solve and create with other children and adults – to learn and express knowledge in community. As recognized by socioculturists, like Lev Vygotsky, social and cognitive realms cannot be disconnected because the child sees, learns and understands within the context of the child's culture and interactions (Flavell, 2002, p. 22-24, Tudge & Rogoff, 1989, p.19). Under this model, adults and more mature or learned peers play a critical role in the child's development by serving as guides: they "arrange the child's activities, regulate the difficulty of the task, direct the child's attention, and provide both explicit and implicit instructions" (Flavell, 2002, p. 24). The child is as an "apprentice," observing and working with an adult or more learned peer, and receiving instruction and feedback from them. One of the important functions played by the adult

or peer in this model is providing opportunities for the child to work in the "zone of proximal development," i.e., on activities which the child cannot quite accomplish alone but can reach with the thoughtful guidance or collaboration of an adult or peer" (Flavell, 2002, p. 24; Berk & Winsler, 1995, pp. 24-26). Providing an environment where children work in the zone of proximal development involves (1) "structuring the task and the surrounding environment so that the demands on the child at any given time are at an appropriately challenging level, and (2) constantly adjusting the amount of adult [or more learned peer] intervention to the child's current needs and abilities" (Berk & Winsler, 1995, p. 29). In addition to this guiding role that may be played by adults and more learned peers, the child's other peers also play an important role in the child's learning: Collaborative work presents extensive opportunities for shared understanding, expression of ideas and theories; disagreement, joint problem-solving, and taking account of another perspective, all of which contribute to children's integration and/or accommodation of knowledge (Berk & Winsler, 1995). Thus, much of children's learning occurs in the context of, and through the medium of, social interactions with peers and adults. For these reasons, social interaction is an integral part of Kids Create workshops, and children in the workshops undertake most of their thinking, experimenting, problem-solving and building in interaction with other participants and/or the adult instructors.

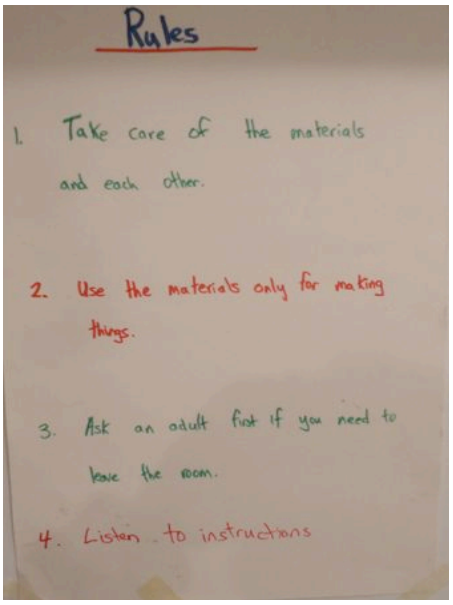
PART III - KIDS CREATE

A. Overview of Kids Create Workshops

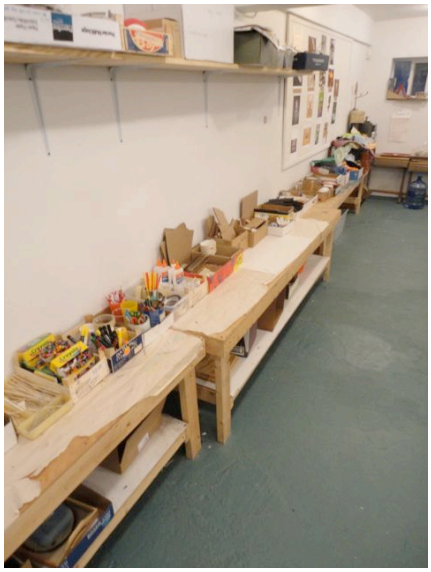
Kids Create offers workshops that typically meet weekly on Saturdays mornings for 2 hours for an average of two months or 8 sessions. The workshops are theme or project-based and involve hands-on, socially interactive inquiry, experimentation, design

and building. The workshops are offered free of charge; families of participants are encouraged to make a voluntary donation to the program at the end of the workshop. Kids Create is currently operated through an existing non-profit arts organization, TSL, where I serve as pro bono youth program director. I plan for and teach all of the workshops, and I am assisted by a TSL staff person during the sessions in order to keep the adult/child ratio low. Maximum enrollment for the workshops is set at 15. The workshops typically have 12-15 participants, and enrollment efforts consist of emailing workshop flyers to a mailing list I have compiled of families who have attended, or expressed interest in, Kids Create workshops, posting workshop flyers in school hallways and on community bulletin boards, and distributing flyers through a couple of teachers in the Hudson schools whom I have come to know through the Kids Create program.

Kids Create workshops are taught in TSL's lower level, which the organization has designated as a space for youth programming. The space had been recently finished, but was totally empty, when I began working with TSL; this allowed me to set up a workshop room as I wanted it for the Kids Create program. In addition to using some old school furniture that had previously been donated to TSL, I worked with a local handy-person to build shelves and tables for the room. We built four work tables of varying heights, as well as long, shallow side tables for materials. The room is set up with material tables and a large bulletin board extending along one wall, a meeting area in one corner of the room, work tables along the other walls and in the center, and a fair amount of clear space for foot traffic between materials and work areas. As can be seen in the following photographs, the space is pretty ideal for the kind of animated, interactive, problem-solving, creating and learning that goes on in Kids Create Workshops.



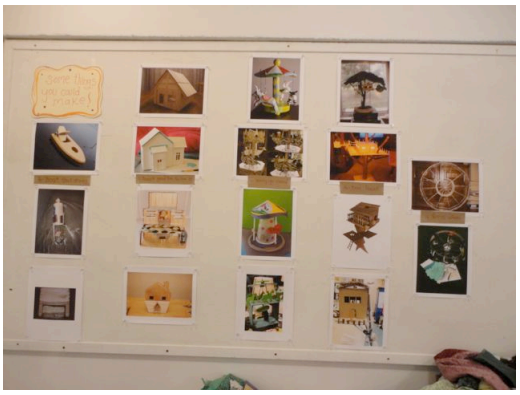
Workshop rules poster



View from entry along materials tables

Closer view of materials set-up

Materials and bulletin board



Closer view of bulletin board

Painting area, shelves for work in progress

Painting table

Meeting area; table covered for papier mache

Work table with glue guns

View of materials tables and storage shelves

Long view of room from entry

Children's work displayed in windows

Kids Create programs use open-ended materials that are recycled, free or low cost. For example, we use lots of corrugated cardboard which I obtain free, in the form of cardboard boxes, from local liquor stores and then cut into sheets and useful sizes and shapes for kids to use. Some workshop materials are donated; others are gathered at little or no cost at tag sales; purchased materials consist of things like low-temperature glue

guns, glue gun sticks, tempera paint, scissors, foam sheets, clay, bamboo skewers, and paper fasteners. I put out a good variety of materials for each workshop, and the materials are carefully organized and well-maintained so that they are easily accessible and appealing.

Kids Create Workshops Offered to Date

Workshop	*Date*	*Sessions*
Design & Build a Model Waterfront for Hudson	Fall 2010	9 (2.5 hrs)
Automata (Simple Machines I – Cam Shafts)	Winter 2011	7 (2 hrs)
Community Build: Mapping Hudson's Community Resources	Spring 2011	8 (1 hr)
Design and Build Bridges	Spring 2011	4 (2 hrs)
Design and Build Toy Theaters	Spring 2011	5 (2 hrs)
Outdoor Shelter Building	Summer 2011	8 (2.5 hrs)
Hand-building	Summer 2011	8 (2 hrs)
Kid Laboratory (household chemistry)	Fall 2011	6 (2 hrs)
Levers & Linkages (Simple Machines II)	Winter 2012	7 (2 hrs)
Design & Build Challenge (structural strength & stored energy)	Summer 2012	5 (2 hrs)
Design & Build Open Studio	Fall 2012	6 (2 hrs)

My overarching curriculum design for Kids Create workshops leads the children through: (a) an introduction to the relevant concepts via images, demonstrations, verbal descriptions, and the written word; (b) a period of observation, questioning, theorizing, testing and experimenting around the concepts; (c) a significant time spent making creations of the child's choosing that utilize the mechanisms/concepts; and (d) a "wrapping-up" and further internalization of the learning through explaining or

demonstrating the concepts to someone else, typically in workshop videos or activities at a workshop closing party. To illustrate the nature of Kids Create workshops, the next section provides a detailed description and program materials for one particular workshop, Levers and Linkages, and then additional short program descriptions and selected workshop materials for a number of other workshops.

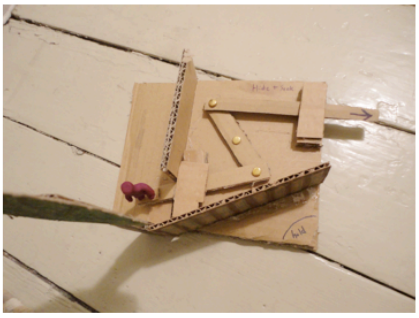
B. Detailed Description of Sample Workshop - Simple Machines Part II (Levers & Linkages)

In the Winter of 2012, I offered a workshop on the theme of levers and linkages. The workshop had 13 participants aged 7 through 12, and we met for two hours each Saturday for two months. This was one in a series of Kids Create workshops designed to give participants the opportunity to discover and experiment with aspects of simple mechanics, and then create small art pieces and models using these concepts.

Kids Create Simple Machines
TSL Workshop for ages 7-12

Kids in this workshop will create their own moving toys (automata), while learning basic principles of how machines work. This workshop is one in a series of TSL Kids Create workshops exploring basic mechanics – this session will focus on levers and linkages. The workshop will provide hands-on opportunities for both creative expression and scientific understanding.

Saturdays 10:00-noon, Jan. 21 – March 10
(no class Feb. 28 – mid-winter break)



Signing Up: Registration is REQUIRED, and workshop size is limited. To register or ask any questions about Kids Create workshops, email Bonnie Scott Jones, TSL Youth Program Director, at TSL-Youth@timeandspace.org. These workshops are **FREE**; participants are strongly encouraged to make a voluntary donation to TSL to keep these workshops going and open to all.

Time & Space Limited, 434 Columbia Street, Hudson NY 12534
518.822.8448 / TSL-Youth@timeandspace.org / www.timeandspace.org

Workshop flyer

The "Levers and Linkages" workshop focused on several related mechanical concepts:

- the work of moving something consists of some amount of effort over some amount of distance;
- the amount of work it takes to move something doesn't change, but the amount of effort can be changed by increasing or decreasing the amount of distance of the

effort;

- a lever is a mechanism that changes the amount of effort of moving something by increasing or decreasing the distance of the effort;
- a linkage is two or more levers linked together to change the direction or location of movement.

Part of my interest in teaching these concepts came from the fact that I didn't really have a concrete understanding of these principles until well into adulthood, and I was not able to "get" them until I had learned them in very hands-on ways. Once I understood these concepts, I found them to be very useful in making sense of, and problem-solving about, the workings of the physical world. I wanted to develop a sequence of activities and materials that would give the kids the chance to explore and internalize those concepts earlier in their lives than I did.

The lesson sequence I prepared for the workshop follows the general progression described above, leading the children from introduction to experimentation to creation and a sense of mastery. That planning sequence is included below, along with commentary contained in blue text boxes, photographs of the workshop in progress, and workshop materials.

Kids Create Simple Machines - Levers & Linkages:
Lesson Plans

Goals:

For participants to understand and experiment with the following mechanical principles:

- the work of moving something consists of some amount of effort over some amount of distance;
- the amount of work it takes to move something doesn't change, but the amount of effort can be changed by increasing or decreasing the amount of distance of the effort;
- a lever is a mechanism that changes the amount of effort of moving something by increasing or decreasing the distance of the effort;
- a linkage is two or more levers linked together to change the direction or location of movement.

For participants to make and experiment with basic types of linkages (push/pull, reverse motion, parallel, bell crank) and the ways that they change the direction, type or distance or motion.

For participants to employ their understanding of levers and linkages in creating their own art constructions with moving mechanisms.

I. Session One – Introduction and Levers

Materials:

Lever diagrams and images (homemade & from web)

Vocabulary poster - lever (a bar resting on pivot point), load (the thing that will be moved by the lever), effort (the force applied to one end of the lever to move the load), fulcrum (the pivot point of lever), linkage (levers connected together to change the motion), guide (a fixed path in which a lever can move).

Child-sized lever – cinder block, blocks of 2x4 glued together to act as fulcrum, couple of flat pieces of wood to use as lever (one a couple of feet long; one about 4 ft long; 3 or 4 inch width wood trim works well)

Per group - Metric rulers, zip loc baggy, masking tape, hundreds of same weigh item (eg pennies), bar of soap (plus couple extra bars for whole group), worksheet
(Extra bags and paint stirrers for making lever to take home)

A. Opening (20)

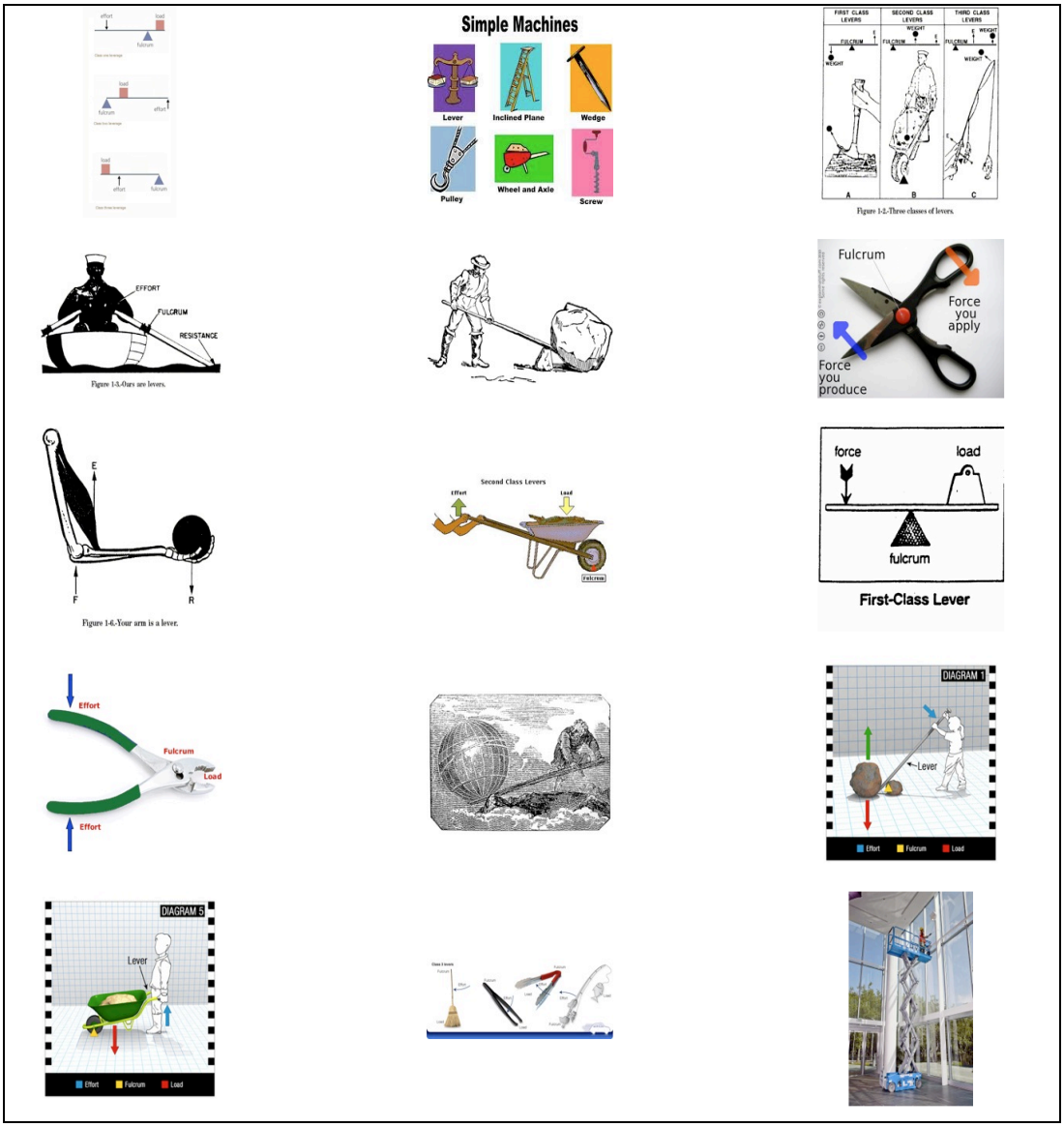
Parents fill out registration and release forms while past workshop participants give new

kids tours of the space; and all kids look at images of levers and linkages in room and at samples of lever/linkage constructions.

The first day of any workshop begins with registration and orientation activities. Returning children typically come into the room right away while their parents fill out consent forms. They greet me and ask about what we will be doing that day; they often have a story to tell me about something they have made or learned that relates to a project we worked on in an earlier workshop. These returning students then start looking around the room – to see what materials we will be using and what kinds of pictures are up on the bulletin board. When new children come into the space, I immediately introduce them to all the other kids in the room and ask one of the past participants to give the new child a tour of the space. At this point, past participants usually do a very thorough job of this orientation, covering not only basics like where the bathroom and water are, but also showing the new children the materials we use and talking to them about how we can use them.

Meeting circle: introduction to each other, rules, workshop theme.

I generally start a first day meeting by having kids introduce themselves, saying their name, age, school and something about themselves (e.g., something they like to do on the weekends). I then give a short introduction to the three rules/expectations of the workshops. This introduction is short, but very important, and I am serious but smiling as I deliver it. I explain the three workshops rules as follows: "First, take care of yourself, others and our materials. This means everyone is responsible for treating each other and our stuff well. Second, use the materials only for making things. They are not for playing -- this keeps us all safe, and what we are here to do together is make things. Third, let an adult know before you leave the room. Otherwise I will look up sometime and not see you and get worried about where you are; and part of my job in taking care of all of us is to keep track of you." These rules embody lots of subrules - e.g. taking care of materials means everyone cleans up; taking care of others means no making fun of other people or what they make. However, I have found that it is effective to just say these three rules and remind the children of them in more specific context as needed. It is very satisfying to see how little I need to say about the rules at this point. There is now a shared expectation/culture among ongoing workshop participants of living in accordance with those rules, and new participants quickly catch onto the behavior and shared expectations of the group.



Selection of lever & linkage images put up in the workshop room

B. Lever Discussion & Group Demonstration/Experiment (30)

Sharing of information and ideas kids already have:

- What is a lever?
- What is the purpose of a lever?
- What are some levers you see in room or images?

Demonstration/Experiment with life size lever

Kids Create workshops bring children of different ages, educational experiences, and socio-economic backgrounds into a shared experience. The diversity of the group produces many opportunities for children to learn from each other. In this group discussion, in which some children had no previous knowledge of levers, an older child who had learned about levers at her local school explained that levers could be used to help lift a load; another child, who attends an international school in New York City, told the story of Archimedes saying that if he had a long enough lever and a place to stand, he could lift the world.

We are going to try to lift the cinder block to the height of the stacked wood blocks. Have one child lift the cinder block without using a lever; how hard is it?

Lifting the block without the aid of a lever.

With a ruler, show how high he had to lift the block get it to the level stacked wood blocks.

Now lift it using a short lever arm; is it any harder or easier?

Measure with ruler how far he had to push the lever down to lift the block (this measurement will be greater than the straight lift).

Trying out a lever with a short lever arm

Now try making a longer lever arm; is lifting the block any harder or easier?
Measure with ruler how far you have to push the lever down to lift the block (the distance of the lift will be longer than the straight lift and than the lift with the shorter lever).

Measuring the longer lever arm that the three children on the floor have set up to test their theory that the longer lever arm will make it easier to lift the load

Have other kids also try the experiment, with everyone thinking about, and sharing their ideas about, the following questions:
Which way is the easiest? Which way has you moving the shortest distance? The longest distance?
What is the connection between how hard her effort is and the distance you have to move?

Wrap up of discussion: So with the long lever, it wasn't as hard to push down but you had to do it for a longer distance; with the short lever, it was harder to push down but you only had to do it for a shorter distance; without a lever, it was really hard, but you only had to lift a very short distance.
No matter which way you use, it takes the same amount of work to lift the block – the work is a mixture of how hard you have to push and for how far; so if you want to push less hard, you have to do it for a longer distance, and if you want to push for a shorter distance, you have to push harder. Either way the total work is the same. The great thing about a lever is it can let you lift something that you couldn't otherwise lift, by making the effort or pushing much less and letting you push over a longer distance. So, if I had to lift a car, I might be able to do it if I had a long enough lever, but without a lever, I would not be able to do it.

C. Small group activity – Lever experiment (50)

(adapted from http://www.sciencebuddies.org/science-fair-projects/project_ideas/Phys_p065.shtml)

Demonstrate building lever using ruler as lever, table edge as fulcrum, soap as load, and plastic bag to hold pennies which will use their weight as the effort of pushing the lever down and the soap up (run through lever vocabulary in process)

Explain experiment –we are going to do an experiment to see how hard we have to push down on the lever to lift the soap, and then we will see if that changes if we move the lever arm so that the part we push on is longer. Since it would be hard to measure how much we push if we just push with our hands, we will put pennies in the bag instead to act as the "push."

Demonstrate setting effort arm at a particular length (e.g. 10 mm) and then adding pennies to bag until we see the soap just begin to lift. Divide kids into groups of 2 or 3 to conduct the following experiments, recording their results on worksheet:

Set effort arm at 5 mm (ie put lever on fulcrum at 5 cm) – how many pennies (marbles, beans, etc) does it take to lift up the soap?
Then try making the effort arm longer – set it at 6 cm, now how many pennies does it take to lift up the soap? (same with 7cm, 8 cm, etc)

A child setting the effort arm of her lever to the next length she will test (with me watching over her).

About half way through the experiment, ask the kids to think, and talk with their partners about, this question: Each time, you are lifting the same bar of soap/the same weight; why do you think the amount of effort (amount of pennies) you need to lift the soap changes?

A child in the midst of the lever experiment; she is carefully assessing whether the soap has started to lift or whether she and her partner need to add another penny to the effort arm of their lever.

Variation (if a group has time): What happens if you double the load to 2 bars of soap – does the number of pennies you need to lift it also double?

Clean up.

D. Discussion of experiment (20)

Discuss results and theories about what happened.

Wrap up: So when the effort goes over a longer distance, you don't need as much of it, and when the effort goes over a shorter distance you need more of it. The total work to lift the bar of soap doesn't change, but since its made up of both effort and distance, you can change the amount of effort by changing the amount of distance. So, as you saw, you can move the soap with just a small amount of push (few pennies) if you the push goes over a longer distance.

II. Session 2 - Exploring linkages, how they work, and how they can alter motion.

Materials:

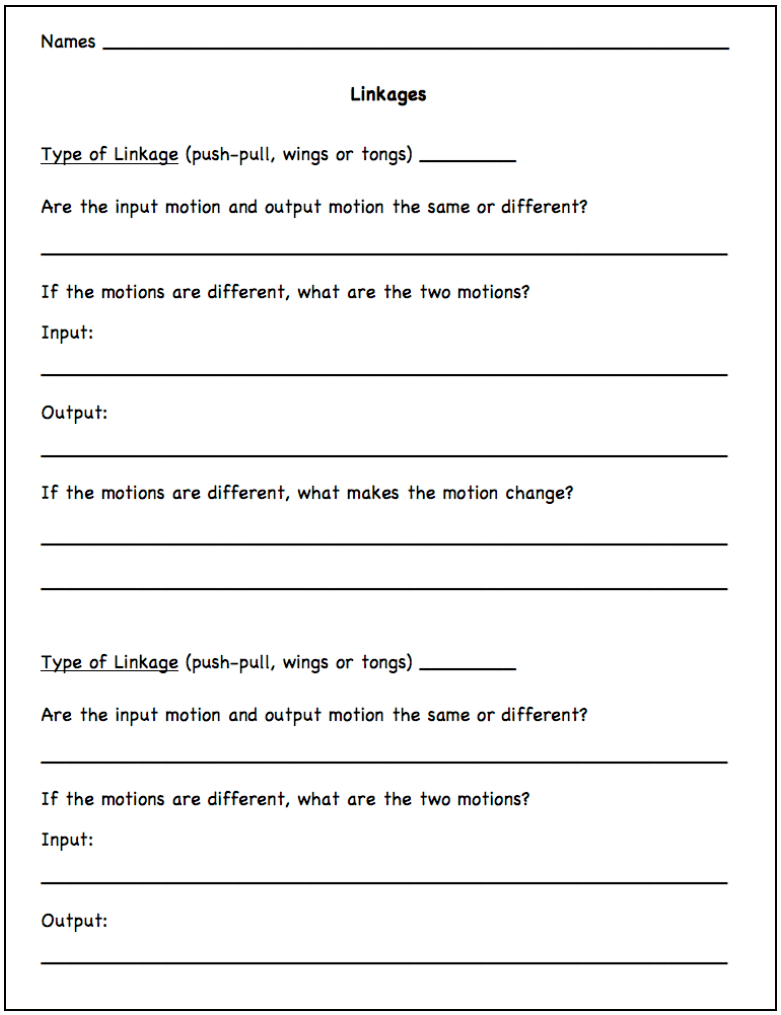
Samples of 3 types of model linkages (push/pull, wings, tongs) and bell crank linkage for demo (homemade)
Sample finished piece (hide and seek) (homemade)
Linkage worksheet (homemade)
Cut cardboard for bases (see size list below)
Cut cardboard of different sizes for levers
Cut cardboard of different sizes for guides
Paper fasteners
2 hole punch tools and 2 hammers, and wood slabs to use as surface for punching on
List of steps for building each type of linkage (homemade)

A. Group discussion: Quick review of levers (10)

Kids explain to each other in the group:
What are levers? How can a lever help me lift something heavy? How does it work?

B. Group discussion: Linkages (15)

Linkages are one or more levers connected together to create a particular movement. Linkages can be used to change the direction of the motion you put in, or to move the motion to a different place.
Do you see any linkages in the room or images in room? (e.g. the arm is a linkage, as illustrated in one of the images on bulletin board). Have kids point out and explain linkages.
Note that a linkage requires an input motion and has an output motion. Look at sample of bell crank linkage – what is the input motion? Output motion?
Explain observation activity: use sample linkage as example to demonstrate observing a linkage and its input and output motions, and then filling out observation sheet.



Names _____

Linkages

Type of Linkage (push-pull, wings or tongs) _____

Are the input motion and output motion the same or different?

_____

If the motions are different, what are the two motions?

Input:

_____

Output:

_____

If the motions are different, what makes the motion change?

_____

_____

Type of Linkage (push-pull, wings or tongs) _____

Are the input motion and output motion the same or different?

_____

If the motions are different, what are the two motions?

Input:

_____

Output:

_____

Worksheet used by each small group as they observed model linkages and inquired into the relationship between linkages and input and output motions.

C. Small group activity – observing and thinking about linkages (20)

You will experiment with the linkage in front of you and talk with your group about whether the direction, type and size of the output motion is the same or different than the input motion. In small groups, explore each linkage and fill out worksheet together.

At end of activity, return to group to discuss results and theories – what did the linkages do to the input motions? How?

D. Demonstration of Building Push-Pull Linkage Prototype (10)

Explain idea of making a prototype for a machine to test it and figure things out before trying to make a whole sculpture or model.
Show a prototype and a finished piece to demonstrate (e.g., push-pull and hide and seek model).

Today we will make a prototype of the push-pull linkage.
Demonstrate making push-pull linkage (including how to use steps sheet if you forget any steps, and how to safely use glue guns).

One of the goals of Kids Create workshops is to help children develop executive functions. The workshops do this by include many opportunities for children to practice strategies such as planning stages of a project, breaking tasks into steps, coming up with designs and theories, testing their ideas and then adjusting them based on experience and new information. One such opportunity in this workshop was the activity of creating a prototype of a mechanism in order to figure out how to make that part work before building a whole model incorporating the mechanism.

E. Activity: Building push-pull prototype (1 hour)

Work alone or in pairs – build push-pull prototype.

F. Clean up

III. Session 3 – Design and Build a Machine with a Push-Pull Linkage

Materials

Same cut cardboard as session 2
Paint, fabric, buttons, yarn, other decorating materials
Examples of push-pull linkage constructions – hide and seek (homemade)
Linkage planning sheet
Steps for Making a Simple Machine – Steps Poster (1. Plan, 2. Build, 3. Paint/decorate (which may require taking machine apart), 4. Put back together and Finish) (homemade)

A. Discussion- brainstorming (15)

Take a look again at your prototype of a push-pull linkage.
You will be making your own machines using this linkage - moving sculptures, models, etc.
What does the output motion remind you of?
Can you think of anything you could make using that linkage? (talk to person next to you and then in group)
Show example of a of a finished piece – does this give you any other ideas?

Two views of sample model with push-pull linkage

B. **Activity explanation (15)**

Explain and demonstrate use of planning sheet to create a design. If it's hard to write or read, you can just draw the linkage and finished piece; you don't need to put it in words.

Explain that we used a base and bars of a certain size to make their prototypes but that the base and bars can be different shapes or sizes in the pieces they make now.

Explain that they can put their linkage on top of a flat base or a stand up base (demonstrate show how to make standing based using two flat pieces of cardboard hot-glued at edge at right angle, with triangle supports) or on a box open at the bottom (show how to add sides to a base and support them with triangles inside the box)

Once you have gone over your design with an adult, you can start to build.

Review steps to making a simple machine (refer to poster).

C. Activity: Design and build your own machine (1 hr. 15)

Spread out among tables to plan and build your machine.

D. Clean up (15)

IV. <u>Session 4 - Finish Machine with Push-Pull Linkage</u>

Group discussion of what kids are making, how things are going, things they have learned, tips they have, questions. (15)

Continue making machines. (1 hr 30)

Participants working intently on their creations; one child is working with her mother

Parents are welcome to attend any of the Kids Create workshop sessions and when they do, they are typically incorporated into the activities, not only working with their own children but also serving as another set of "adult hands" that children can seek out when they need help.

If any kids finish early, they can design and build another machine or make something else of their choosing.

A participant showing her completed work – a castle with a couple standing in the doorway. When the linkage is pushed in the back of the castle, the woman pops out in front of the doorway.

Clean up (15)

V. Session 5 - Wings Linkage - Design and Build

Use sequence laid out above in II.D. for demonstrating how to build this linkage.

Use sequence laid out above in III. for brainstorming, and designing and building a machine using this linkage.

When a child in the workshop finishes making a significant project - such as a simple machine with a linkage - I turn off the lights, get the other children's attention and have the child announce and show what she has made; then I and the other children applaud. Other children then have the chance to ask questions about, or comment on, the creation. The child showing her work typically displays a great deal of pride and excitement during these moments, and the other children display genuine interest in, and enthusiasm for, each other's work. In addition to contributing to the children's sense of accomplishment, these moments help create a culture of mutual support and encouragement in the workshops, and they give children supportive practice in standing in front of an audience, and sharing themselves, their ideas and their work. I believe these experiences contribute to the children's ability to present themselves and their ideas effectively to others – skills which are important to success in school and many other aspects of life.

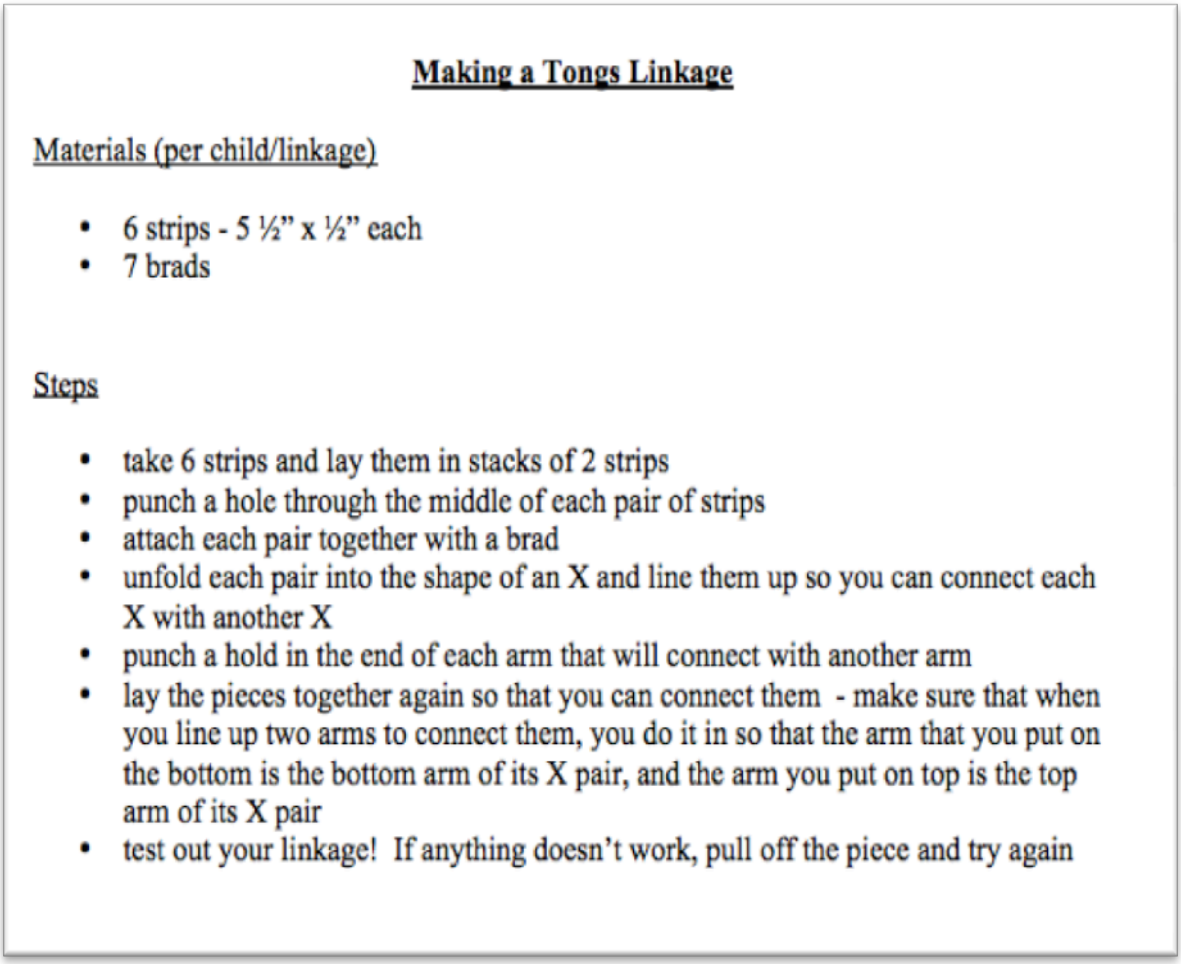
A child punching a hole in cardboard with a mallet and hole-punching tool.

Children in Kids Create workshops use real tools with appropriate safety equipment. The use of real tools gives participants a sense of competence, importance and responsibility, and the kids demonstrate this through their use of great care when working with the tools.

VI. Session 6 - Tongs Linkage - Design and Build

Use sequence laid out above in II.D. for demonstrating how to build this linkage.

Use sequence laid out above in III. for brainstorming, and designing and building a machine using this linkage.



Making a Tongs Linkage

Materials (per child/linkage)

- 6 strips - 5 ½" x ½" each
- 7 brads

Steps

- take 6 strips and lay them in stacks of 2 strips
- punch a hole through the middle of each pair of strips
- attach each pair together with a brad
- unfold each pair into the shape of an X and line them up so you can connect each X with another X
- punch a hold in the end of each arm that will connect with another arm
- lay the pieces together again so that you can connect them - make sure that when you line up two arms to connect them, you do it in so that the arm that you put on the bottom is the bottom arm of its X pair, and the arm you put on top is the top arm of its X pair
- test out your linkage! If anything doesn't work, pull off the piece and try again

Poster of materials & steps for building a tongs linkage.

In Kids Create workshops, information like that given in the poster above is provided in visual form, through demonstration, and verbally. Such information is also provided in writing to give opportunities for reading practice and to encourage self-reliance in problem-solving and figuring out next steps.

Note that the last step of the poster assumes that something might not work, and instructs the reader of what to do in that circumstance – simply pull off the piece and try again. The workshops encourage children to think of the act of creating (whether creating an object or anything else) as involving an initial design or idea, a development stage, and then a testing and redesigning/rethinking period. Obstacles and failures along the path to success are treated as expected and totally acceptable. In this manner, the workshops seek to encourage trial and error, a capacity for taking reasonable risks, and a tolerance for hurdles and temporary failures.

VII. Session 7 – Finish Projects, Filming

Finish all linkages, final touches on work.

Filming in adjoining room of kids showing and explaining their linkages.

If any kids have additional time, they can make another linkage or make something else.

A finished piece. This child has made a zoo with an elephant that pops in and out of the zoo by means of a push-pull linkage.

VIII. Session 8- Prep and Open House/Closing Party

Group discussion about how to set up room as a museum, posters to make, demonstrations to set up for parents/visitors. (15)

Kids work on set up activity of their choosing (putting out kids' work, making posters, setting up demonstration). (45)

Clean up (15)

Group discussion about things to do and say when acting as a "museum guide" for parents and visitors. Role-play acting as a museum guide. (15)

Open house (30)
Video set up on loop in lobby space.
Snacks (brought in by parents) set up in lobby.
Match arriving visitors with participants who will give them a "tour" of the "museum."
Kids can move between watching video, leading tour, talking with other kids and visitors.

Video of participants displaying and explaining their simple machines (view athttp://vimeo.com/39244200)

Workshop videos and Open Houses/Closing Parties give children a chance to consolidate their knowledge by explaining and demonstrating their work to others. The videos and parties also give participants a chance to share their pride in their work and new knowledge.

Appendix – Cut Cardboard Needed

This is sufficient cardboard for 15 kids to make all three of the linkage types, with some extra for additional linkages and waste/mistakes.

rectangles: 20 or more of each of the following two sizes:
5 1/2" x 7"
4 1/2" x 6 1/2"

half inch strips
8 1/2" x 1/2" (20 or more)
5 1/2" x 1/2" (200 or more)
4" x 1/2" (20 or more)
3" x 1/2" (40 or more)
2" x 1/2" (160 or more)
1/2" x 1/2" (450 or more)

Important note about cutting strips: strips need to be cut so that the tubes inside the cardboard run in the direction of the long dimension of the strip; otherwise they are weak and bend easily.

C. Short Descriptions of Other Kids Create Workshops with Selected Workshop Materials

This section provides short descriptions, and an illustrative sampling of workshop materials, for a number of other Kids Create workshops.

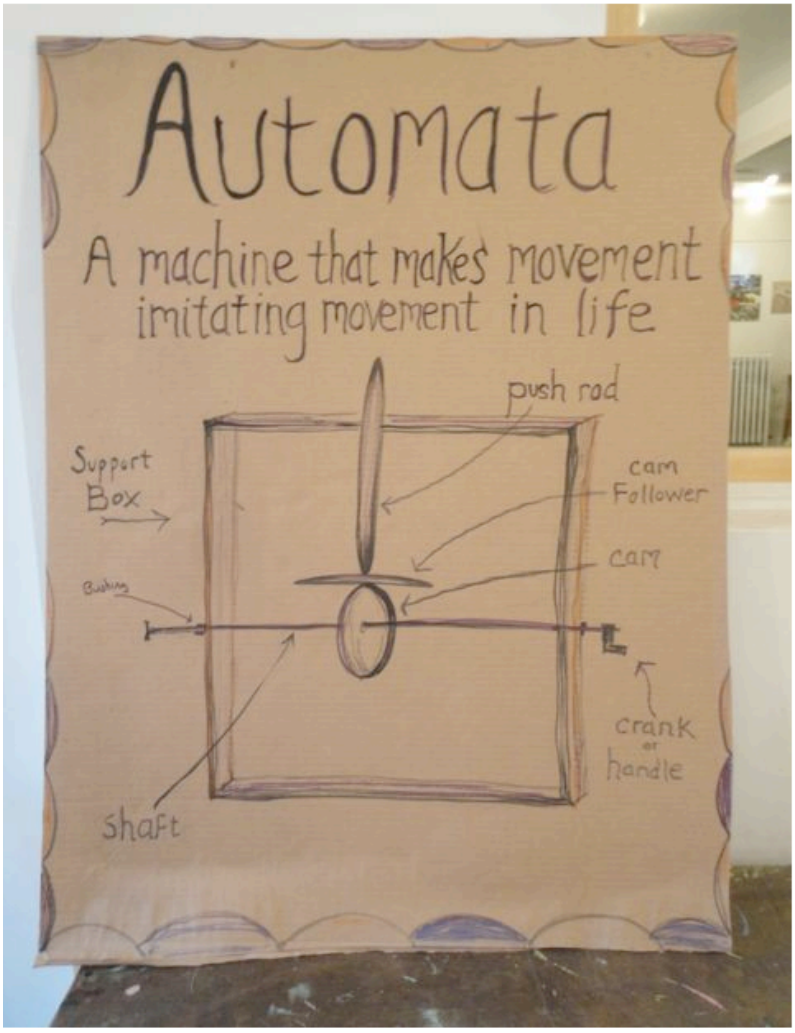
Automata (Simple Machines Part I – Cam Shafts)

Participants explored simple principles of mechanical movement, and used those principles to make their own hand-operated moving toys. Children studied and experimented with model cam shafts, working together to answer inquiries about what kind of movement each model made, how a cam can convert the circular movement of a handle into another kind of movement (such as back and forth or up and down), and what kinds of different movements are made by different cam shapes and sizes. Children then built their own working cam shafts with a cardboard frame, skewer shaft and foam cams, moving figures and scenery.

Selected Workshop Materials

Cam shaft models & completed automata models.

Kids Create workshops often use models that children can touch and observe to better understand how things work and how they are put together.

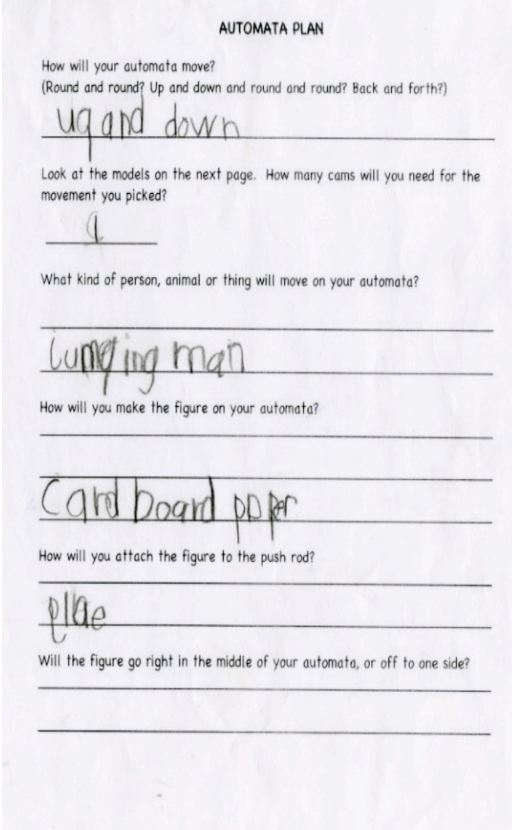


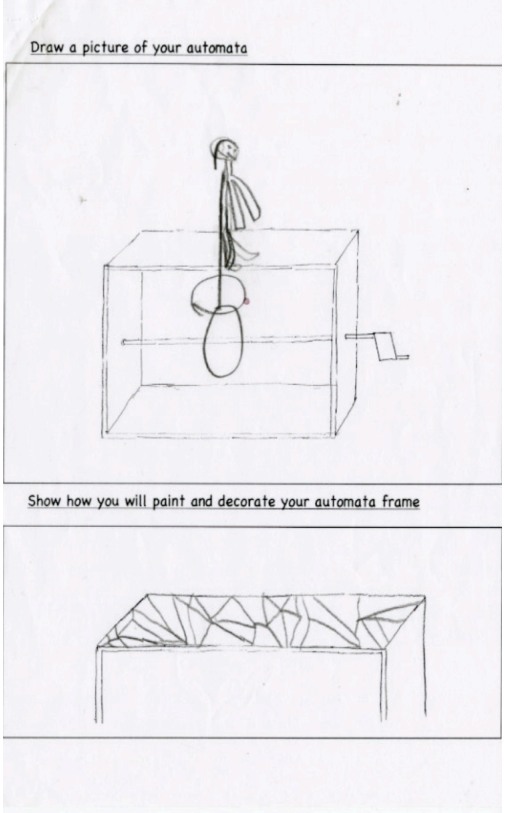
Automata diagram used for discussion and displayed in room.

Diagrams are used in workshops to reinforce information and concepts that are also explored verbally and through demonstration. These diagrams give participants practice in the important skills of reading visual information and using diagrams to plan or explain.

Example of materials set-up for automata building.

Workshop materials are clearly organized and laid out to maximize children's self-reliance in finding the materials they need to build what they have designed. For example, participants know where to go to get foam and a template for building a cam, and if one child forgets, another child inevitably leads them over and reminds them.





Sample of child's completed planning sheet.

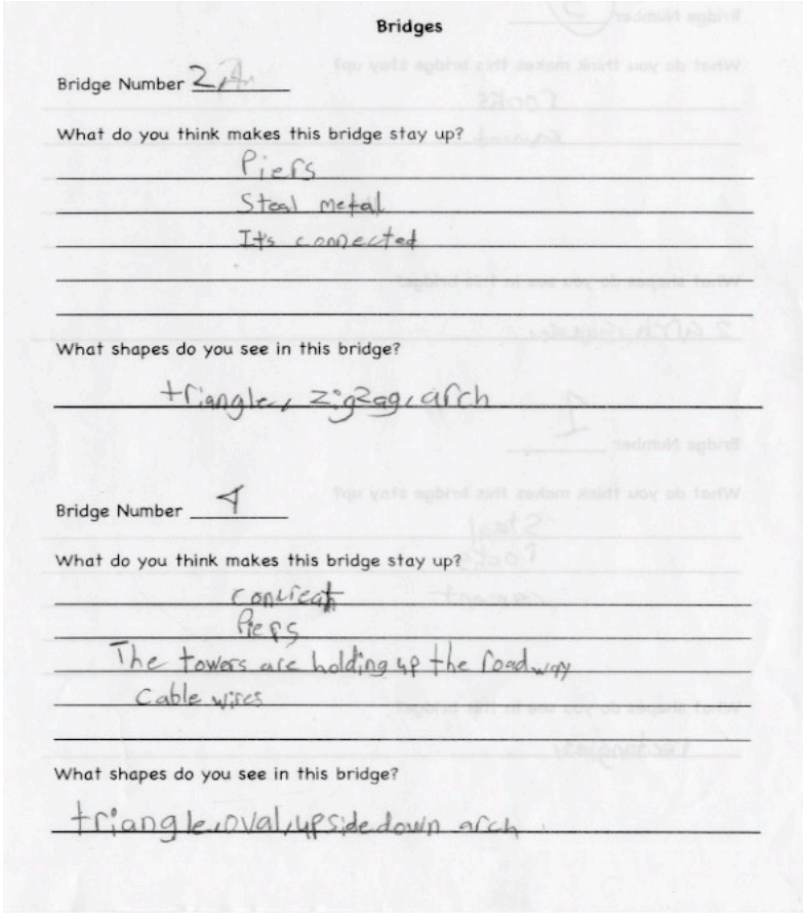
Structured planning tools like this one give children practice in learning how to transform an idea into something concrete.

Video of participants displaying their automata (view at http://vimeo.com/22688569)

Design and Build Bridges

With bridge-building as our theme, participants explored fundamental principles of forces and structures. They undertook hands-on activities to understand the connection between shape and structural strength, discovering that triangles offer advantages over squares and rectangles because triangles do not change shape when force is applied to one side. They also learned about the concepts of tension (pulling force) and compression (pushing force), and worked together to consider which of these forces the load exerts on each of the four basic bridge types: beam, arch, suspension, lift. Participants then designed and built their own model bridges.

Selected Workshop Materials



Bridges

Bridge Number 2

What do you think makes this bridge stay up?

Piers
Steal metal
It's connected

What shapes do you see in this bridge?

triangle, zigzag, arch

Bridge Number 4

What do you think makes this bridge stay up?

Piers
The towers are holding up the roadway
Cable wires

What shapes do you see in this bridge?

triangle, oval, upside down arch

Sample of completed observation sheet used with photographs of different bridge types.

Kids Create workshops often employ models or photographs along with observation sheets at the outset of a thematic study. This observation process, typically undertaken in small groups and followed by a whole group discussion, provides a means for children to articulate their existing knowledge and questions about a subject as we begin our study.

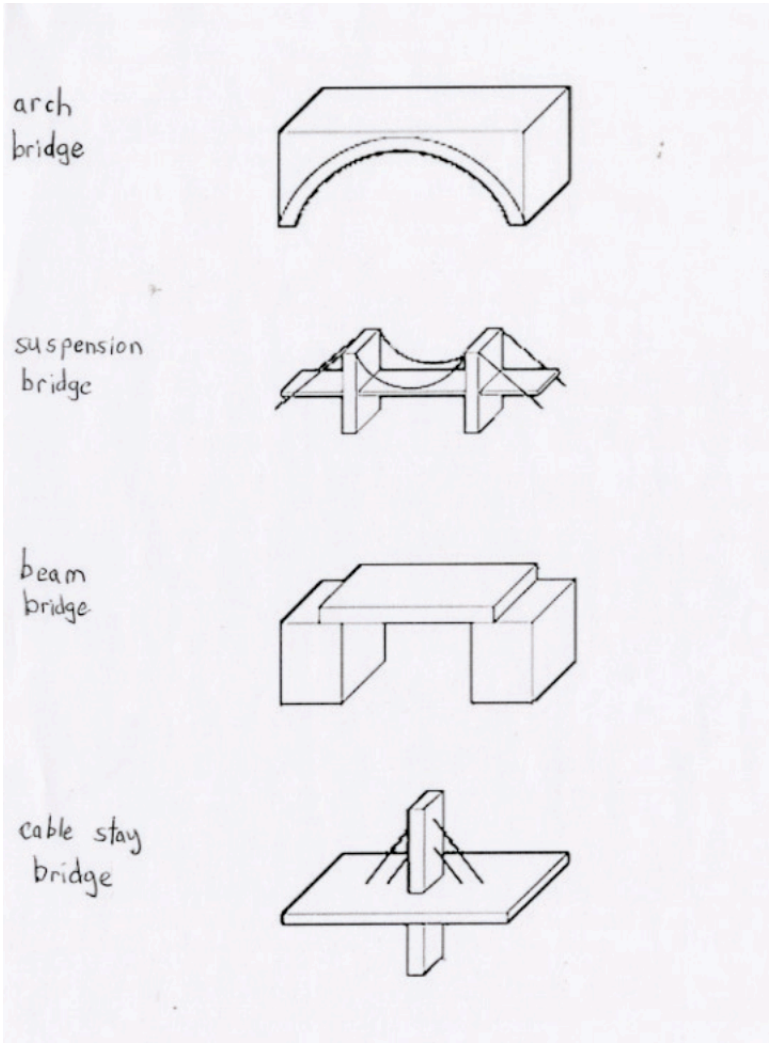
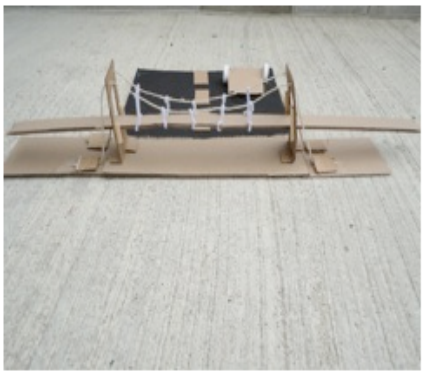


Diagram of four basic bridge types

This simple diagram, used alongside a collection of photographs of actual bridges, helped children recognize the essential characteristics of different bridge types. The diagram gave children an experience of seeing how a diagram could give them a framework for understand the much more complex images of the photographs.



Model bridges built by participants

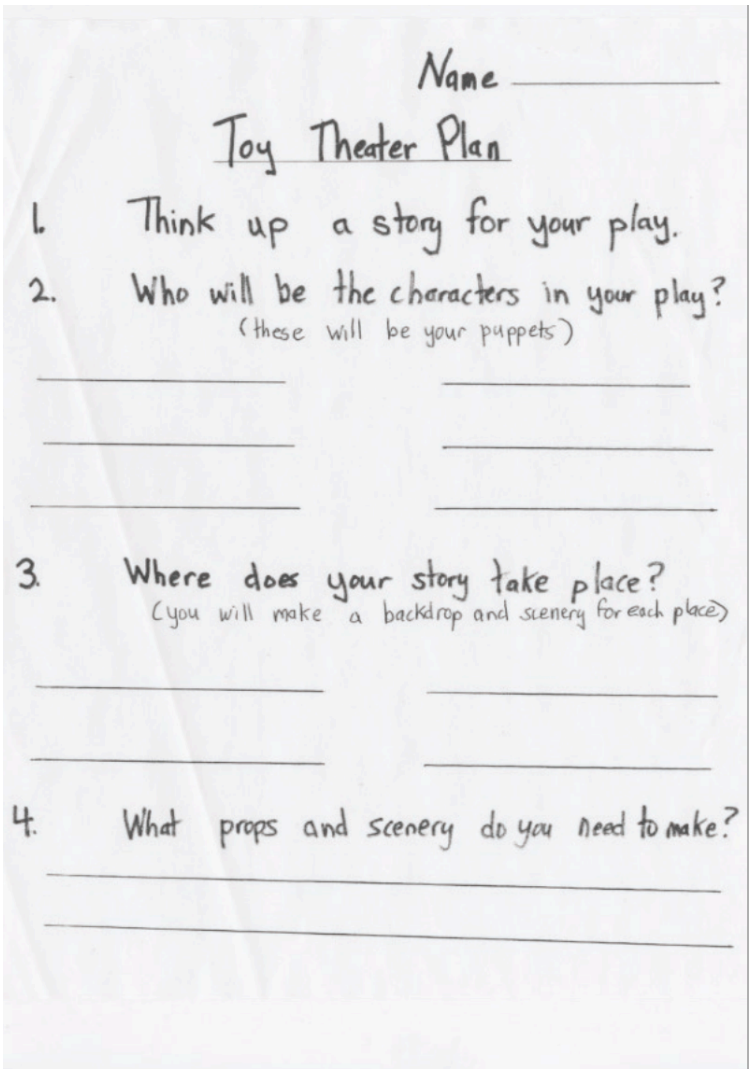
Design and Build Toy Theaters

The group worked together to identify the basic elements of theaters and plays, such as story, characters, scenery and props. They were then introduced to the concept of the "toy theater," a miniature version of theater first used in the early 19th Century and still used as an art medium today. Informed by group brainstorming and sharing of ideas with their peers, as well as diverse images of toy theaters put up in the room, the children each came up their own play idea and imagined a toy theater to house it. They made a plan for the settings and characters that would be in their play, built a theater structure and then created backdrops, props and stick puppets for their plays. Participants presented their theaters and plays to family and friends during a workshop closing party.

Selected Workshop Materials

Sampling of toy theater images put up in room for visual reference and inspiration

The Kids Create classroom contains a very large bulletin board which is typically covered with diverse set of images related to the workshop theme. These images provide inspiration, contribute to children's understanding of the theme, and often offer food for thought. In addition to thematically-based images on the walls, the workshop room contains a small collection of visual reference books for children's use.



Name _____

Toy Theater Plan

1. Think up a story for your play.

2. Who will be the characters in your play?
(these will be your puppets)

_____ _____

_____ _____

_____ _____

3. Where does your story take place?
(you will make a backdrop and scenery for each place)

_____ _____

_____ _____

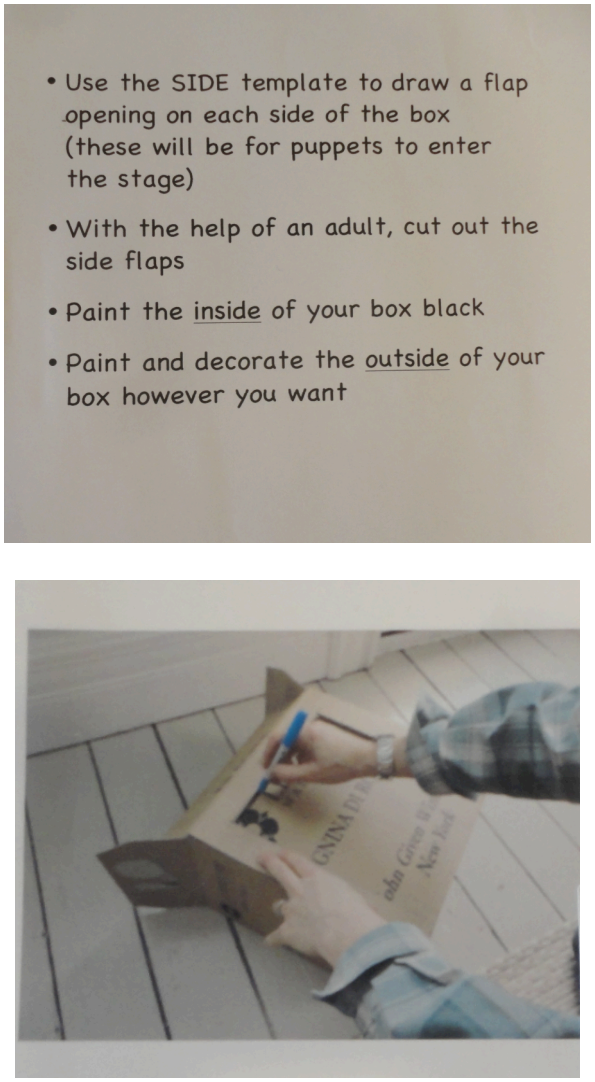
4. What props and scenery do you need to make?

_____

_____

Toy theater planning sheet.

A planning sheet like this is typically filled out by the child (with adult help as needed) after the whole group has had a brainstorming discussion, and the children have talked together in pairs or small groups about their ideas. This gives children time to come up with, talk through, and develop ideas before they need to put them on paper. Such planning sheets serve as a starting point, and ideas often change and evolve.

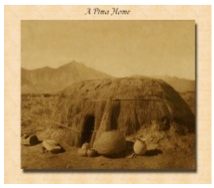


Excerpt of illustrated instructions for toy theater building.

Written instructions with accompanying photographs were put up on the wall to complement an oral description and demonstration of the same instructions. In all Kids Create workshops, instructions are given in as many forms (e.g., written, visual, oral, demonstration) as possible so that they are accessible to children of diverse ages, abilities and learning styles. Such written and verbal instructions also promote children's self-reliance (and reliance on each other) as children are able to walk over and look at the instructions if they forget what to do next or are unsure of how to carry out a step.

Outdoor Shelter Building

Participants explored the fundamental concept of shelter: what is shelter and how have people with different resources created shelter? Children shared their existing knowledge and questions about shelter, and started to answer some of their questions as they worked in small groups making observations about a diverse collection of shelter images. In particular, they learned that shelters often employ an inner structure or framework that supports an outer covering. In later sessions, children used natural building materials (wooden branch poles, birch bark, branches with leaves on them) to construct simple shelters. After starting with shelters that used only gravity to hold materials together (lean-tos), children learned simple lashing (rope tying) techniques through demonstrations and practice. They then used their new lashing skills to build more complex and stable structures. Children worked in small groups to plan their structures, and they collaborated on construction and ensuring "work site" safety.









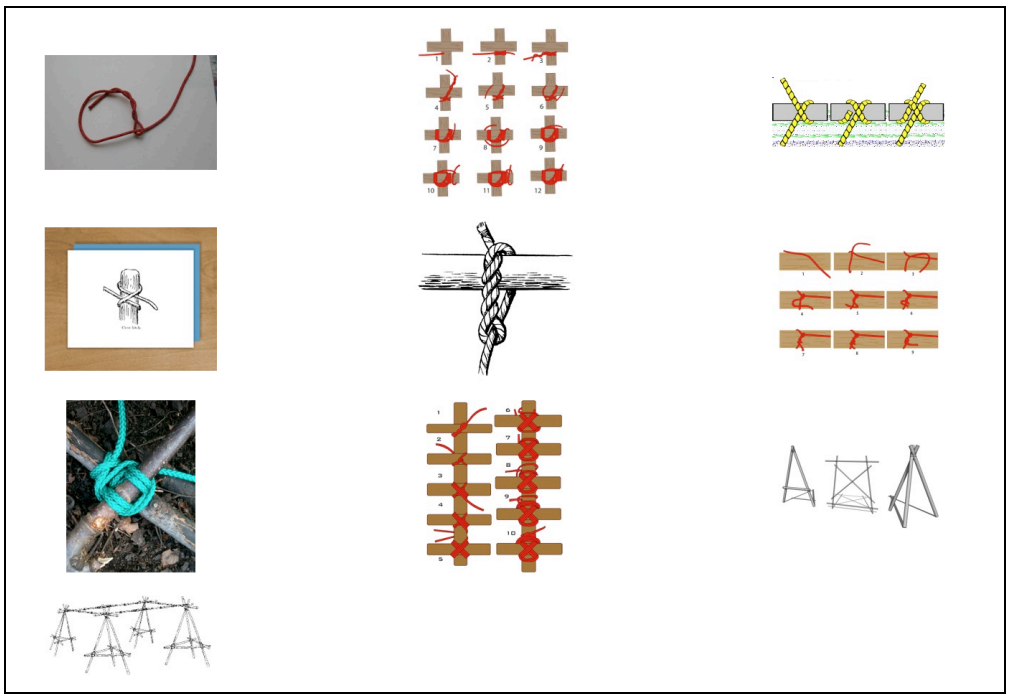






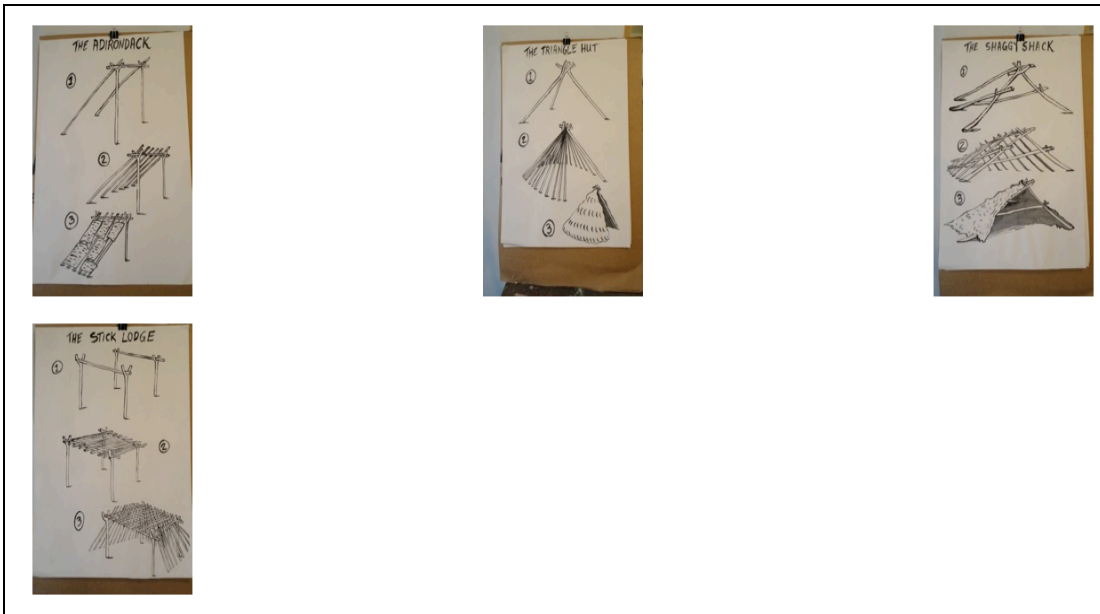


Shelter images put up in room and used for observation and discussion.



Lashing diagrams put up in room.

These images complemented instructions given verbally, by demonstration, and through practice.



Lean-to diagrams used as plans for group building projects

Participants were given the opportunity to build shelters from existing plans (pictured here) as well as to design their own shelters and build those.

Slideshow of participants displaying their shelters (view at http://vimeo.com/28262251)

D. Mission and Strategies of Kids Create

This section sets forth the mission and strategies of Kids Create, which are reflected in the workshop descriptions above. The mission of Kids Create is to contribute to the healthy development of Hudson children by providing high quality, accessible programming that: (a) engages children in creative and playful exploration of materials, tools, and important concepts; (b) gives children diverse opportunities to see themselves as inventors, builders, and artists, and to experience the empowerment, pride, and satisfaction that can come with that; and (c) provides children with an experience of a community in which they have responsibility, freedom and agency.

Kids Create seeks to serve this mission by offering free weekend and summer workshops with three core features:

(a) in depth, hands-on study of fundamental principles of science, engineering or social studies (e.g., properties or matter, simple mechanical movement, community resources);

(b) creative expression using open-ended materials;

(c) an environment of "structured freedom" in which clear expectations of respect, responsibility and shared endeavor provide a guiding framework in which the children make choices about what they will do and how they will do it, thereby developing a sense of competency, agency, ownership and citizenship.

E. Common Elements of Kids Create Workshops

As is illustrated in the workshop descriptions above, Kids Create programming encompasses diverse themes and activities, but also features common elements that reflect the program's mission. These common elements include:

- a focus on specific themes or concepts that are of importance to the children's understanding the world, of relevance to the children, and suitable to the children's developmental stage
- sufficient workshop time to permit sustained, in depth and multi-path exploration of the subject themes or concepts
- exploration of the properties of materials and uses of tools
- multiple means of presenting concepts and instructions (orally, in writing, by demonstration, by pictures)
- ample, interesting visual materials related to the theme or project at hand (for understanding, reference, motivation)
- shared responsibility for clean up, safety, and respectful and supportive treatment of others
- opportunities to create from the children's imaginations and interests
- opportunities to engage in problem solving (both independent and collaborative)
- opportunities to make something real and tangible that is an expression of the child's vision and choices
- opportunities to work independently, with other children, and with adults on common goals

- opportunities to work and learn in cooperation with people of different ages, races, socio-economic classes, and communities
- opportunities to share the children's work with the larger community through open houses (which the children help organize and during which the children act as "tour guides"), web publication of slides or video taken by staff during the workshops, and local news coverage

These common components and elements have been chosen not only to support learning, engagement and enjoyment, but to contribute to the children's development of a healthy sense of pride and competence. As explained earlier in the paper, children of the ages served by these workshops are in the midst of a critical developmental stage in which they will gain – or fail to gain – a sense of competence. That sense of competence is vital for later managing the challenges of adolescence. The workshops address these developmental needs by giving children from diverse backgrounds, and with wide-ranging skills and abilities, opportunities to express themselves, try new things, develop their interests and skills, study ideas deeply, and work collaboratively on projects that are shared with the community. By doing so, the workshops give children the chance to feel proud, successful, and accomplished, and to see that they are important and valued members of the community with much to offer and share.

PART IV - REFLECTIONS

Having developed and facilitated Kids Create for over two years now, I have had opportunity to reflect on its accomplishments, potential next steps, and my own experience of the program.

A. Program Accomplishments

Kids Create has achieved much of what I had hoped to accomplish with the program. An understanding of the program's achievements has crystallized for me as I have watched the patterns of children's behavior during workshops. Those observations can be summarized in short form as follows.

The children in Kids Create workshops are engaged. They are engaged in the concepts we are learning, engaged with their ideas, engaged in their interactions with other kids, me and other instructors, and engaged with what they are making. The children in Kids Create workshops are curious and productive. The workroom is a busy, active place where kids are figuring things out, asking questions, trying out theories, solving problems and planning strategies.

The children in Kids Create workshops have a sense of belonging. They walk into the workroom in the morning without hesitation, offering a greeting or a story; they are enthusiastic to get started and go pull their works-in-progress off the shelves; they move easily around the space, gathering what they need from familiarly-organized bins of materials.

The children in Kids Create workshops treat each other with equity and consideration. They are interested in each other's ideas; they help each other when one of them can't find something or needs an extra hand to hold a piece that is drying; they choose to work on joint projects when they have similar interests; they do not tease each other or put each other down; they are gentle with each other and careful with each other's work.

The children in Kids Create workshops experience pride and satisfaction in their work. They are eager to show each other and their parents what they have made; they are excited to see themselves and their creations in the workshop videos; and they want to take their works home because they like them.

During each Kids Create workshop, I see a diverse group of children of different ages, educational experiences and socio-economic backgrounds become a community of enthusiastic creators, inventors, learners. These observations, and the responses of the children and their families, have shown me that Kids Create is a place where children engage in deep and playful learning, build their sense of competency in themselves, engage in meaningful interactions with other children and adults, and develop their curiosity about the world and what they can do in it.

B. Potential Next Steps

Kids Create is at an important juncture. Having facilitated weekly workshops and summer mini-camps at Time & Space Limited ("TSL") for two years, I have a good sense of what the current incarnation of Kids Create can do and a number of ideas about potential areas for future growth.

Reaching More Children

One of my primary motivations in developing Kids Create has been to provide the kinds of creative, hands-on, exploratory learning experiences that are offered in some private schools/OST programs to urban, low-income, public school kids unlikely to have access to those kinds of experiences. The program serves this end now to the extent possible within the program's current incarnation; however, there are ways that the program could grow or shift to reach more children, particularly those least likely to have

other access to the type of opportunities offered in Kids Create. Possible ways to grow in this regard include: (a) offering a modified version of Kids Create as part of the school district's afterschool program or its lunch club program; (b) turning Kids Create into a five day per week afterschool program at TSL and working with the school district to make Kids Create an offering that parents can choose as part of the school district's afterschool program, and to which the school district would provide bus service.

Creating Stronger Ties With the Schools

My review of the professional literature on OST programs has made me aware that well-established ties to schools, school staff, and/or school curriculum can be important to leveraging the impact of the Kids Create program (National Institute for Out of School Time, 2007, pp. 2-3; Wallace Foundation, 2011). Closer connections with the local schools would facilitate targeted outreach to children most likely to benefit from Kids Create programs, and would provide opportunities to connect workshop subjects with school curriculum to support children's learning. Accordingly, I am considering a couple of potential approaches to further developing ties between Kids Create and the schools: (a) offering a modified version of one Kids Create workshop at the intermediate school as a lunch club; and (b) coordinating with teachers from a particular grade to offer a workshop at TSL that would complement their curriculum with in-depth, hands-on activities not feasible in the classroom (e.g., offering Kids Create simple machines workshops at a time that supports the 4th graders' study of basic mechanics).

Making Kids Create More Financially Sustainable

Kids Create has functioned so far on a "shoe string" and is not financially sustainable in the long term with its current resources. In order for the program to grow

it must develop a solid, independent base of financial support. In order to achieve this end, I am considering both (a) establishing a non-profit corporate structure for Kids Create and seeking foundation support and (b) charging families sliding scale fees for workshop participation.

C. My Experience of Kids Create

Writing this paper has given me time to reflect not only on what the Kids Create program does for children, but also on what it does for me. As is common for an educator, it gives me great joy to have relationships with children and to help them learn and grow. A less obvious source of gratification comes from the rich opportunities for learning and creative expression that *I* experience in planning and leading Kids Create workshops. I pick workshop themes and materials that are, at the outset, unfamiliar but intriguing to me. To prepare, I immerse myself in learning about and experimenting with the concepts and materials – expanding and contracting my focus and the level of complexity and detail I am studying, and at each expansion or contraction seeking greater clarity. When I have become versed enough in the topic, I see the core concepts clearly and simply, and can break the topic into manageable pieces that I present to the kids, by making diagrams and posters, collecting relevant images, and setting up activities, all of which will provide a path for the children to make some of the discoveries I have made, and others that will be theirs alone. I have found this process of preparing for workshops to be a highly enjoyable and creative way for *me* to learn, process, explore, and consolidate subjects that I don't know much about, and to build and make things I have never tried before.

Finally, Kids Create is my way of giving something of my resources, abilities and "lessons learned" to the next generation. This desire to guide or shape the next generation is a common one, and one that people act on in many different ways. Kids Create is an embodiment of what I seek to give the next generation, through the sense of community I seek to promote, the educational and artistic experiences I seek to provide, and the knowledge I seek to share.

CONCLUSION

This paper has set forth the motivations, contexts and beliefs that led me to develop an OST program for children, and it has described and documented the "Kids Create program I have developed in Hudson, New York. This is a beginning. It is a reflection on why I have developed the program, a description of how I have gone about it, and an examination of what I have been able to build. Kids Create makes manifest my vision of a creative, engaged, exploratory learning and making environment. Creating the program has thereby given *me* exactly the sort of gratifying experience Kids Create seeks to give children – of creating something tangible and meaningful from a conception of the mind and an ambition of the heart.

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APPENDIX: PERMISSIONS

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December 21, 2012

Bonnie Scott Jones has permission to use Time & Space Limited / TSL's name in her Integrative Master's Project for the Bank Street College of Education.

Linda Mussmann & Claudia Bruce
Co-Directors

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Sample Photo Permission Form

I grant Bonnie Scott Jones permission to include photographs taken of my child(ren) at Kids Create workshops in the thesis Bonnie is submitting to Bank Street College of Education.

_____ _____

Signature Printed name

_____

Date